

SAN FRANCISCO BAY AREA REGIONAL RAIL PLAN

Draft Report Summary

AUGUST 2007

METROPOLITAN
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1.0 INTRODUCTION

It has been a half-century since the last comprehensive look at the San Francisco Bay Area's rail system. The 1957 Rail Plan for the Bay Area was one of the most ambitious efforts of its time, envisioning an integrated rail network covering all nine Bay Area counties. The plan's central conclusion still rings true today:

"If the Bay Area is to be preserved as a fine place to live and work, a regional rapid transit system is essential....

A satisfactory solution to the Bay Area's traffic problem cannot be reached by building freeways alone. The solution can be reached only through a system of mass rapid transit developed on the premise of moving people—not automobiles."

On March 2, 2004, Bay Area voters approved Regional Measure 2, which increased bridge tolls on the region's seven state-owned bridges by a \$1, raising an estimated \$125 million each year. RM2 funds will implement the Regional Traffic Relief Plan — a comprehensive strategy for addressing congestion in the transbay bridge corridors and enhancing the convenience and reliability of the Bay Area's public transit system. RM2 specified and provided funding for the preparation of a comprehensive master plan for Bay Area rail.

This Bay Area Regional Rail Plan seeks to complete the unfinished work of the 1957 plan, and to address new opportunities not anticipated in that plan.

The charge for this Regional Rail Plan is to examine ways for the Bay Area to incorporate passenger trains into existing rail systems, improve connections to other trains and transit, expand the regional rapid transit and railroad-based rail network, increase rail capacity, and coordinate rail investment around transit-friendly communities and businesses.

This plan also includes an analysis of potential high-speed rail routes between the Bay Area and Central Valley. It offers recommendations on the most promising high-speed rail alignments for Pacheco and Altamont passes. These recommendations are formulated independently of the California High-Speed Rail Authority (CHSRA). The intent of this plan is to provide input to the CHSRA as it prepares its final environmental document for the Bay Area to Central Valley High-Speed Train Program. The CHSRA will ultimately decide on the preferred route for high-speed rail between the Bay Area and Central Valley.

2.0 REGIONAL RAIL PURPOSE AND NEED

2.1 Plan Purpose

The purpose of creating the Regional Rail Plan is threefold:

- To comprehensively identify a vision for a robust, interconnected system of Bay Area passenger rail improvements and expansions to guide investment decisions;
- To create a safe, fast, reliable, and integrated passenger and freight rail network that addresses the tremendous growth anticipated in transportation demand; and
- To sustain and enhance the economic vitality of Northern California, while minimizing the impact on the environment, by providing excellent transit service that strengthens existing downtowns and economic centers.

2.2 Why Rail Is Important to the Bay Area

• A Growing Region

Today, the nine-county Bay Area is home to nearly 7 million people and supplies more than 3 million jobs. By 2050, the region's population is anticipated to grow by over 40 percent for a total of 10 million people. This population growth will place tremendous pressure on the existing transportation network. The total number of daily trips made by Bay Area residents is projected to grow by 35 percent to a total of 28.5 million by 2030, wherein we will be logging over 200 million vehicle miles of daily travel. Further, by 2030, work trips by transit will see a net increase of 433.000 transit riders on an

average weekday or about 108 million additional transit riders each year. Added capacity and expansions will be required in order to accommodate increased demand on the existing transit system.

• In-Commuting from Neighboring Sacramento and San Joaquin Valleys

While the Bay Area continues to grow at a steady rate, our Sacramento and Central Valley neighbors are experiencing their own tremendous population growth. San Joaquin County, just east of the Altamont Pass, will see more than a 200 percent increase in population by 2050. Similarly, Sacramento County will experience a 132 percent growth increase. The greatest increase in travel growth into the Bay Area over the next few decades is anticipated to come from these neighbors to the east. By 2030, in-commute into the Bay Area by commuters from the Sacrame nto Valley will rise to over 200 percent (+49,000 commuters) and San Joaquin Valley will grow by 112 percent (+60,000 commuters). Without stronger transit systems leading to the main Central Valley cities and connecting them to each other, there will be fewer opportunities for the cities to plan for the kind of compact development that the Bay Area is moving towards.

International Trade and Regional Freight Movement

The region's economy depends on the movement of goods within, into and out of the Bay Area. Freight traffic demands is expected to grow in excess of 350 percent over the next 50 years. The growth is already happening; bulk cargo had a 23 percent growth in one year between 2003 and 2004. Many of these lines are shared by passenger rail, such as the Capitol

Corridor, and all of them are approaching their capacity. Expanded and improved rail infrastructure will be needed to support the demands of freight and passenger growth to mitigate the explosive growth of truck traffic on our roads.

High Levels of Traffic Congestion

Bay Area polls often find persistent traffic congestion as the primary concern for our residents. Congestion often seems to come "out of nowhere" but there is clear cause – as the volume of traffic exceeds a road's capacity, the speed of traffic decreases exponentially rather than gradually. Solano County provides an acute example of how conditions can degrade quickly once roads are saturated. Dispersed growth patterns, tremendous truck traffic in the I-80 corridor, and significant increase in interregional commuting between the Bay Area and Sacramento have lead to higher transportation demand in Solano County. As a result, over the past five years, the I-80 corridor had a 607 percent growth in daily vehicle hours of delay. Other travel corridors throughout the Bay Area are experiencing similar congestion and delay.

2.3 Consequences of Not Addressing Bay Area Rail Needs

High Cost to Our Economy

The adverse economic impacts of congestion and inadequate transit access are already becoming apparent. The 150,000 daily hours of Bay Area commute congestion had an estimated cost of \$2.6 billion in 2003 alone. And, congestion would have been about 50 percent worse if not for the

region's public transit system, according to the Texas Transportation Institute's 2005 Mobility Study Performance Measure Summary. The region's economy is becoming increasingly reliant on shipping from our ports – whether vegetables from the Central Valley or electronics from Silicon Valley. Longer shipping times because of congestion can add significant cost to these goods.

High Cost to Our Environment

Without an expanded rail system, the natural environment may also suffer. Over 400,000 acres of land in the Bay Area are at risk from development. Promoting development in walkable communities near transit is our best hope for taking development pressure off open space and farms. According to the Reconnecting America and the Center for Transit-Oriented Development, there is an anticipated demand for an additional 550,000 homes near transit in the Bay Area by 2030. Compact, transit-oriented development only functions well when transit service is frequent and reliable enough that residents will ride, foregoing the number of cars they own and number of car trips they take.

• High Energy Consumption and Greenhouse Gas Emissions

A fast growing environmental concern is global climate change, and the transportation section is responsible for 40 percent of California's greenhouse gas emissions, and up to 50 percent in the Bay Area. These emissions are directly proportional to the amount of gasoline burned, so offering real transportation choices that can reduce driving will be critical for cutting greenhouse gas emissions.

3.0 REGIONAL RAIL VISION

Key elements of the Regional Rail vision include:

• Ring the Bay with Rail

A long-term vision of many in the region is to ring the Bay, connecting the three major Bay Area cities (San Francisco, Oakland, and San Jose), with a fast, frequent and integrated passenger rail network. BART and Caltrain would provide seamless, rapid transit service during peak and off-peak to the region's largest employment and population centers, with intermodal connections at key nodes. In addition, the rail network would also provide direct or indirect transit access to the region's three major international airports and numerous local transit hubs.

• The Right Technology Should Be Used With the Right Corridor

A broad range of rail technologies, including BART and conventional passenger trains like Amtrak are considered in this plan. Emerging technologies such as non-Federal Railroad Administration compliant Electric Multiple Unit (EMU) trains are also explored. These trains run on standard gauge rail tracks but must be separated from freight trains. They have significant cost and speed advantages over conventional trains and are included in the plan on selected segments.

• The BART System Is the Backbone

The BART system serves as the backbone of the regional rail network and it is clear there will be capacity constraints and

renovation needs for the existing system. This reinvestment should be a top regional priority over the next few decades.

• The BART System's Outward Expansion Is Nearly Complete

While BART will always remain at the core of the region's rail system; its outward expansion potential is limited. Once the extension to San Jose is completed, and the existing lines are brought to logical terminals in Livermore, Santa Clara and East Contra Costa County, no additional outward extensions of the BART technology are contemplated. This is important, not only because portions of the existing BART system will be reaching capacity limits, but also because higher-speed express trains would better serve outlying suburban markets. Instead, BART will evolve toward a higher-frequency, highly productive metro system. New BART lines are considered only to alleviate capacity concerns in the Transbay Corridor and to serve dense urban markets in the inner East Bay and San Francisco, and to provide additional connectivity to the regional/inter-city rail system.

• The Bay Area Needs a Regional Rail Network

As the BART system becomes more of a high-frequency, close stop spacing urban subway system, similar to the Paris Metro or Berlin "U-Bahn" network, it would need to be complemented with a larger regional express network serving longer-distance trips. The European counterpart to the regional express network is the "S-Bahn" in Berlin or the Regional Electric Rail (RER) in Paris. These European rail systems provide a truly integrated inter and intraregional rail system that minimizes transfer barriers for its customers. The

next step is to incrementally separate passenger rail rights-of-way from freight rights-of-way and over time develop a higher speed, express regional rail network. These trains would run largely on existing tracks, some shared with freight and others in their own rights-of-way with specialized signaling and dispatch systems. Over the next 40 years, much of the new investment in intercity and suburb-to-city regional rail in Northern California will utilize modern, standard-gauge equipment, following the model of most European and Asian capitols.

Rail Infrastructure Must Be Expanded to Accommodate Growth In Passenger and Freight Traffic

To allow the region's economy to continue growing while meeting increased passenger needs, the freight and passenger rail systems must be increasingly accommodated. This plan acknowledges that certain freight corridors require additional mainline tracks to support high-frequency freight and passenger services.

- High-Speed Rail Provides Opportunities to Enhance and Accelerate Regional Rail Improvements
 High-Speed Rail complements and supports the development of regional rail – a statewide high speed train network would enable the operation of fast, frequent regional services along the high-speed lines and should provide additional and accelerated funding where high-speed and regional lines are present.
- Rail Transit and Focused Transit-Oriented
 Developments Must Go Hand in Hand: If the region is
 to make a substantial investment in rail infrastructure, the
 land-uses surrounding the stations/stops and along the rail

- corridor must be fully integrated with the transportation and they must be supportive of one another. Regional and local policies and programs that support focused land-uses must be in place to make this happen.
- Institute a New Governance Structure for Delivery of Rail Services: Delivering high-quality, efficient rail services will require institutional changes from the multiple transit operators and multiple providers of regional rail that is in place today. The "new" entity(ies) would be responsible for planning, design, funding, construction, and/or maintenance and operations of passenger rail. The region must set a course of action to initiate and implement the necessary institutional changes.
- Successor to Resolution 3434 Needed to Advocate for Rail Funding: Securing public/private funding for rail expansions and operations and maintenance is a tall order, but can be done if the region forges consensus behind a program of projects from which to advocate for funding in Sacramento and Washington D.C. MTC's Resolution 3434 set a powerful precedent that having a consensus agreement in place will help the region to not only articulate a shared vision about rail expansions but also lay out a strong advocacy platform by which we could aggressively compete for scarce public/private, regional, state and federal funds.

4.0 REGIONAL RAIL STUDY STRUCTURE & PROCESS

4.1 We've Been Working on the Rail Plan - A Team Effort

The Metropolitan Transportation Commission, the Peninsula Corridor Joint Powers Board (Caltrain), the Bay Area Rapid Transit District (BART), and the California High-Speed Rail Authority (CHSRA) joined efforts over the past two years to develop a long-range vision for improving the passenger rail system we have in place and expanding its reaches to serve future Bay Area travel demand.

We received plenty of help along the way –

- Technical review and direction was provided by a regional rail steering committee, comprised of local passenger and freight rail operators, including Caltrain, BART, Capitol Corridor, Altamont Commuter Express (ACE), Sonoma-Marin Area Transit District (SMART), Caltrans Division of Rail, and Union Pacific Railroad and Burlington Northern-Santa Fee Railroad, along with the county congestion management agencies and the Transbay Transit Center Joint Powers Authority and Port of Oakland. In addition to Steering Committee meetings, the passenger and freight rail operators were consulted at key milestones throughout the study effort.
- An advisory group of academics, environmentalists, and business people also offered their technical expertise.

- Our neighboring regional agencies and county government associations such as Sacramento Area Council of Governments (SACOG), San Joaquin Council of Governments (SJCOG), Transportation Agency for Monterey County (TAMC), and Santa Cruz County Regional Transportation Commission (SCCRTC) helped us to broaden our scope and consider interregional rail travel and connectivity beyond our ninecounty borders.
- Stakeholders and the general public became involved early in the study effort through a series of rail visioning workshops conducted in late 2005 wherein they helped us to brainstorm about possible extensions of existing service and new rail routes. Stakeholders also provided their input through the regional rail steering committee meetings that were open to the public and will continue to do so through the community outreach workshops occurring in summer 2007.

4.2 Study Goals and Objectives

The Regional Rail Plan represents a vision of an integrated and interconnected system of passenger rail improvements and expansions for the Bay Area. The four elements of regional rail are rapid rail transit (BART), railroad-based services, and high-speed rail services, and freight rail.

The plan's network and services are intended to:

- Address the combined challenge of moving people and goods;
- Provide people with a link to commercial, employment, and residential centers:
- Expand capacity for goods movement to support the regional economy;
- Serve as the backbone of an integrated regional transit network with seamless connections at key transit hubs to local transit services;
- Accommodate development of statewide high-speed rail, and enable the operation of regional services along highspeed rail lines, and vice versa;
- Identify policies and incentives to encourage local governments to create well-designed, walkable communities with a mix of services near transit; and,
- Explore a governance structure that can develop regional system improvements and deliver coordinated, customeroriented services.

4.3 Study Scope

The Regional Rail Plan effort was organized into three distinct study phases, as described below:

Phase 1 – Visioning: Kick-start study effort by brainstorming possible extensions of existing service and new rail routes through stakeholder and public outreach workshops. Define vision statements to help identify candidate rail options for consideration in study alternatives.

Phase 2 – Vision-Based Alternatives Development &

Analysis: Using vision statements, identify distinct conceptual alternatives for three regional rail outcomes (regional rail only, regional rail with high-speed rail entry from east, and regional rail with high-speed rail entry from the south). Refine study alternatives in response to technical input and feedback from passenger and freight rail stakeholders on initial conceptual alternatives. Refine study alternatives with high-speed rail upon evaluation of regional rail only alternative and ridership analysis of high-speed rail options. Conduct analysis that takes into account engineering feasibility, cost, ridership, and operational, environmental and implementation issues.

Phase 3 – Draft/Final Plan: Prepare draft and final plans identifying regional and high-speed rail extensions and services for the near-, intermediate- and long-terms.

5.0 STAKEHOLDER AND PUBLIC OUTREACH - WHAT WE HEARD

5.1 Stakeholder Outreach Messages

In October 2005, a week-long planning charrette with passenger and freight rail operators and other stakeholders were conducted to brainstorm some initial planning guidelines.

Ten themes emerged as common planning principles, as follows:

- Develop a visionary rail plan for the next 50 years
- Respect existing rail service improvement plans
- Think like a passenger—ensure convenient, efficient service
- Connect transit and trains
- Offer adequate capacity
- Separate conventional freight and passenger services
- Use proven technology
- Incorporate cost-effective solutions
- Develop a comprehensive funding plan
- Transportation and land use are linked

5.2 Public Outreach Messages

In late November/December 2005, MTC, Caltrain, BART, and the CHSRA conducted an extensive public involvement program to engage the public in thinking about what the Bay Area rail system should look like in 2050, and more

specifically, as a first step, what issues, alternatives and screening criteria should be considered as part of the study.

These public visioning workshops/scoping meetings were conducted in Oakland, San Jose, San Francisco, Livermore, Modesto, San Carlos, Suisun City and Santa Rosa. These workshops served double duty as official public scoping meetings for the CHSRA's environmental process for the Bay Area to Central Valley High-Speed Train Program. Large crowds of over 500 participants voiced a wide range of interests and ideas about how to expand the rail network.

Looking across all the comments received during this outreach effort, including written and email correspondence, the following points summarize the key messages from the public. These messages reflect the predominant opinions expressed, however, in most cases, participants voiced opinions reflecting the opposite point of view.

• Connectivity between transportation modes (rail-to-rail and rail-to-bus/ferry/other transit/bicycle/pedestrian), and to other regions is extremely important to ensure reliable, convenient travel across the Bay Area and neighboring regions. Participants expressed the need for buses, shuttles, and other options for going the first or last mile from rail stations.

- There were split opinions on whether the proposed highspeed train system should enter the Bay Area via Pacheco Pass or Altamont Pass alignments.
- New rail routes and stations should be built along major travel corridors and high-density areas, and surrounded by transit-oriented developments, including affordable housing.
- Preserving and acquiring right-of-way for rail are high priority action items to be pursued immediately.
 Consideration should be given to utilizing existing rights-ofway when possible.
- Freight and passenger service cannot share tracks for much longer. Both need their own set of tracks to avoid conflicts and service delays. The large amount of freight that moves between the Bay Area's ports and the Central Valley significantly impacts our freeways, particularly I-580.
- Accessibility and rail service connections in low-income minority areas should be maximized; however, community disruption and displacement should be minimized when acquiring rights-of-way and constructing new rail lines.
- The concept of "one system, one ticket" via a regional fare system and a universal fare card was suggested to ensure seamlessness in the regional transit system.
- Bay Area transit agencies were encouraged to communicate and coordinate amongst themselves, to refrain from competition, and when warranted, to consider consolidating for cost and efficiency purposes.

- Advanced rail technologies should be applied wherever possible. Although caution was expressed by those who prefer the use of proven technologies.
- A new Bay crossing for rail should be revisited to accommodate new regional rail or high-speed rail service.
- Numerous ideas were suggested on how to improve and expand BART, Caltrain, Capitol Corridor and ACE services, including: BART extensions to San Jose and Livermore (with some opposing such extensions); Caltrain electrification and extension to San Francisco, Gilroy and beyond; ACE track separation from Union Pacific and extension to Modesto; and Capitol Corridor upgrades and extension to Reno.
- Participants rated "maximize rail transit connections and accessibility" as the most important evaluation criterion to be used during the screening and evaluation of rail project ideas. The "maximize ridership/revenue potential" and "maximize service to and promotion of transit-oriented development" evaluation criteria were also rated high.
- Participants overwhelmingly agreed that transit-oriented developments make sense for the Bay Area, their communities and for themselves.

These themes and input from rail stakeholders and public workshops provided the basis to generate rail alternatives and evaluation criteria to test those alternatives.

6.0 ALTERNATIVES DEFINITION & EVALUATION - STEP-BY-STEP

Step One: Base Network

Recognizing that Resolution 3434 represents MTC's regional rail investment over the next 25 years as adopted first in the 2001 Regional Transportation Plan and reaffirmed in the subsequent plan update, Resolution 3434 is included as part of the "base case" network. Therefore, the study effort focuses on defining options for rail improvements and expansions beyond Resolution 3434.

Resolution 3434 rail projects include:

- 1. BART/Oakland Airport Connector
- 2. BART/East Contra Costa Rail (eBART)
- 3. BART/Fremont-Warm Springs Extension
- 4. BART/Warm Springs-San Jose
- 5. MUNI/Third Street Corridor & Central Subway
- 6. Caltrain/Downtown San Francisco Extension & Transbay Transit Center
- 7. VTA/Downtown-East Valley
- 8. Sonoma-Marin Rail (SMART)
- 9. Dumbarton Bridge Rail Service

Step Two: Vision Statements

A set of vision statements was developed for each of the four elements of regional rail – rapid rail, railroad-based, high-speed rail, and freight rail services. In lieu of formally evaluating and screening the wide range of rail service options, these vision statements guided the formulation of various

candidate rail service options to be considered in the study alternatives. The vision statements are intended to describe significantly different thematic approaches to the development of each study alternative.

BART

- Core Capacity: BART remains largely as is, with improvements focused on system renovation and core capacity needs.
- Mass Transit ("Metro System"): BART is not extended but infill stations are constructed and service is concentrated to provide mass transit service in dense areas with express bus service and/or skip stop service being used to provide adequate travel times for longer length trips. Alternative technologies are used to extend coverage except where short extensions of the BART technology would provide the most beneficial solution.
- **Regional Expansion**: BART is extended and expanded beyond Resolution 3434 to become a system providing regional service throughout the Bay Area counties similar to the original BART plan.

Railroad-Based Passenger Services

- **Separate Regional Passenger Rail Network**: Rail is upgraded to ultimately provide 115 mph service operating throughout the region on separate electrified grade-separated trackage along principal line segments; passenger service is withdrawn from existing freight tracks along principal lines thereby improving capacity for goods movement.
- Existing Passenger Services Shared with Freight Rail –
 Appropriate capacity and operational improvements
 including signaling, passing tracks and/or multi-tracking and
 route alignments are constructed along shared lines to
 accommodate the projected increases in combined passenger
 and freight demand in shared freight/passenger corridors
 using FRA-compliant equipment with higher speeds. High speed rail, if present, would be on separate trackage using
 non-FRA compliant equipment.
- **Hybrid System** A hybrid system is purused in which the rail solution is selected on a corridor-by-corridor basis to select the most appropriate vehicle technology and running way treatment with consideration for adjacent corridors and other systems (e.g., BART and High-Speed Rail) so that a consistent, workable systemwide plan results.

High-Speed Rail Visions

- **South Entry**: High-Speed Rail enters the Bay Area from the South through San Jose, and links are added for service to San Francisco and Oakland.
- **East Entry**: High-Speed Rail enters the Bay Area from the East via the Tri-Valley area (Livermore/Pleasanton), and

- links are added to connect to San Jose, Oakland, and San Francisco.
- Regional Overlay Services: High-Speed Rail planning efforts would include the development of regional "overlay" services using the high-speed rail infrastructure with additional investments in facilities and compatible rolling stock necessary to support all of the proposed services.

Freight

- **Existing Freight Operations Practices** Future freight movements are dispatched by freight railroads consistent with existing practices and improvements are made to existing freight lines to accommodate traffic growth.
- Freight Dispatching Optimized Future freight movements are dispatched to optimize the utilization of regional rail infrastructure and improvements are made within existing rights of way to accommodate traffic growth needs.
- Consolidated with Freight By-Pass Lines Portions of
 the regional rail system are consolidated under public
 ownership and future freight movements are controlled from
 a consolidated passenger-freight dispatcher center, which
 hands off freight trains to the private railroads at selected
 points of connection. Improvements are made both within
 existing rights of way as well as along other available rights of
 way to accommodate traffic growth. Freight traffic is routed
 away from major urban areas where feasible.

Step Three: Study Corridors

To facilitate the assembly of the study alternatives, the study area was divided up into corridors. Within each corridor, the intention is to develop alternative packages composed of consistent alignment and station options to support all of the proposed services. Later, the alternative packages could potentially be "mixed and matched" by corridor based upon the evaluation results to develop the recommended hybrid alternative.

The corridors have been defined as areas connecting between major population centers where a substantial portion of the trunk travel within the corridor is longitudinally along the defined route. To the extent possible, corridors are geographically distinct; however, they may overlap at major regional centers, in which case some of the corridor rail infrastructure may be shared between services serving multiple corridors. Twelve corridors used in the study are:

- BART System (all lines)
- US 101 North Corridor (Marin? Sonoma)
- North Bay Corridor (Marin? Solano)
- I-80 Corridor (Auburn? Oakland)
- East Bay Corridor (Oakland? San Jose)
- Transbay Corridor (San Francisco? Oakland)
- Peninsula Corridor (San Francisco? San Jose)
- South Counties Corridor (Santa Cruz, Monterey, San Benito)
- Dumbarton Corridor (Redwood City? Union City)
- I-680 & Tri-Valley Corridor (Contra Costa & Southern Alameda)
- Central Valley Corridor (Sacramento? Merced)
- Grade Crossings and Grade Separations (all lines)

Step Four: Study Alternatives

Twelve study alternatives were identified based on the vision statements. Three study alternatives were developed for Regional Rail without High-Speed Rail Alternative:

- One alternative emphasized regional expansion for BART coupled with shared passenger-freight railroadbased services,
- One emphasized a metro system for BART coupled with separate passenger-freight railroad-based services, and
- One emphasized core capacity for BART with corridorspecific railroad-road based services and freight by-pass lines.

With additional stakeholder and Steering Committee input, the three Regional Rail without High-Speed Rail alternatives were winnowed to two alternatives, which were then subjected to further testing and evaluation.

Nine study alternatives were developed for Regional Rail with High-Speed Rail – three alternatives included different combinations of regional rail and high-speed rail services from the south via San Jose to San Francisco and Oakland; and six alternatives included different combinations of regional rail and high-speed rail services from east via Tri-Valley to Oakland, San Francisco, and San Jose. Refinements to the Regional Rail with High-Speed Rail alternatives were later refined based on the travel analysis prepared for the CHSRA's draft environmental document for the Bay Area to Central Valley High-Speed Train Program.

The final study alternatives that were identified with and without high-speed rail are as follows:

- Existing: Includes existing Capitol Corridor, Amtrak San Joaquin, Altamont Commuter Express (ACE) and Caltrain standard passenger rail, along with BART services; these systems currently integrate with local rapid transit to provide end-to-end mobility.
- Baseline Year 2030: Encompasses MTC's Regional
 Transit Expansion Program (Resolution No. 3434), including
 nine new rail extensions and significant service expansions to
 existing rail lines; introduces Sonoma-Marin Rail Transit
 Project (SMART), Dumbarton, and eBART, as well as
 enhancements to the Capitol Corridor, Amtrak San Joaquin,
 ACE and Caltrain. It also includes BART "Core Capacity"
 improvements.
- Alternative 1 Year 2050 Regional Rail with BART Systemwide Expansion Focus: No high-speed rail; standard passenger rail shared with freight (capacity improvements as needed); freight dispatching optimized on shared lines; separate freight and passenger tracks on high capacity corridors; short-haul freight between Port of Oakland and Central Valley via Altamont; BART "Regional Expansion;" New BART Transbay Tube; and new San Francisco Subway. Improvements to construct this system are estimated to cost nearly \$40-billion in present day (2006) dollars. Systemwide regional rail ridership on an average weekday would reach 1.35-million riders by Year 2050.
- Alternative 2 Year 2050 Regional Rail with Railroad-Based Services Expansion Focus: No high-speed rail; lightweight passenger rail system separated from freight on

- high volume corridors (higher speed, grade separated and electrified system); Transbay rail tunnel to allow extension of Peninsula electrified service to connect with East Bay; freight operating practices independent from passenger operations; and BART "Mass Transit" provider with additional stations and short extensions. Alternative 2 is expected to cost \$37-billion in present day (2006) dollars and would carry nearly 1.20-million rail passengers on an average weekday in Year 2050.
- High-Speed Rail Year 2050 Entry from East via Altamont Pass: Starting with the recommended Regional Rail network without High-Speed Rail, revisions were made to the regional network to reflect the inclusion of a highspeed alignment entering the Bay Area from the East. These revisions include the additional investment in corridors where high-speed rail would operate as well as consideration for operation of regional services operating on the highspeed lines and opportunities to accelerate improvements to regional corridors affected by the Altamont alignment.
- High Speed Rail Year 2050 Entry from South via Pacheco Pass: Starting with the recommended Regional Rail network without High-Speed Rail, revisions were made to the regional network to reflect the inclusion of a highspeed alignment entering the Bay Area from the South. These revisions include the additional investment in corridors where high-speed rail would operate as well as consideration for operation of regional services operating on the high-speed lines and opportunities to accelerate improvements to regional corridors affected by the Altamont alignment.

Step Five: Evaluation Criteria

The evaluation of the study alternatives was conducted on a corridor-by-corridor level using criteria such as engineering feasibility, capital costs, travel demand, operational impacts, connectivity, environmental, and implementation issues.

- **Engineering Feasibility**: The condition, configuration and traffic on the existing passenger and freight rail system in the Bay Area was first inventoried to provide the basis for the engineering analysis. For each study alternative, the study's technical consultants performed conceptual civil engineering of railroad track, grade and sub grade construction, incidental structures, stations and maintenance, servicing and layover facilities. Further, the technical consultants performed conceptual structural engineering with consideration for geotechnical factors for major structures, including conventional railroad and/or high-speed rail crossings of San Francisco Bay and the Carquinez Strait was also performed. Lastly, the technical consultants also performed signal and communication systems engineering and cost estimation to an appropriate level of confidence, as well as conducted an evaluation of potential for railroad electrification for each study alternative.
- Capital Costs: For each study alternative, the technical consultants performed cost estimation to an appropriate conceptual level of confidence of railroad track, grade and subgrade construction, including major incidental structures. Cost and environmental issues represent prominent concerns in Bay crossings, and therefore, were closely evaluated.
- **Travel Demand**: The travel forecasts used in this study to estimate ridership potential are derived from two modeling

- systems: (1) MTC's intraregional travel model which focuses on local highway and transit characteristics and behavior associated with shorter-distance trips (such as commuting and shopping); and (2) statewide interregional model developed for MTC and California High-Speed Rail Authority to evaluate high-speed rail alternatives in the state. This interregional model captures behavior for longer-distance travel including induced trips, business and commute decisions, recreational travel, attributes of destinations, reliability of travel, party size, and access/egress modal options.
- **Operational Impacts**: The technical consultants developed a "sketch plan" evaluation of capacity based upon readily available information supplemented by planning level analysis. Mainline cross sections for principle line sections were evaluated based upon general magnitude of intended freight and passenger services to be supported. Major factors that determine capacity of rail lines include, but are not limited to: number of main tracks, location and configuration of crossovers, number of locations where trains can meet and/or pass, ability to get freight trains clear of main line tracks (passing tracks), type of signal and method of traffic control, grades and curvature, passenger train frequencies, traffic mix between freight and passenger, and so forth. Factors that tend to reduce or restrict capacity include, among others: distance between stations, ability to meet or pass train stopped at stations largely determined by platform configuration, amount of switching activity blocking or fouling the main line tracks, locations where trains tend to queue up, capacity restrictions around yards and terminals, interchange locations, and junction points.

- **Connectivity**: Connectivity points are important to the mobility capability of the passenger and are proven to increase patronage for the overall rail network. In this vein, the technical consultants identified several locations for connectivity among the rail networks and local transportation systems. The connectivity points provide passenger connections between two or more rail services making it easier for the passenger to reach their destination. Major connectivity stations and their potential services were identified for each study corridor. They were organized into three groups, depending on their impact and importance in terms of population served and operators present – statewide, regional, or local relevance. Schedule coordination is key to these connectivity points. In addition, the technical consultants also considered local and regional transit connections, building upon the Regional Measure 2 Transit Connectivity Study and the Transportation 2035 Plan's Regional Express Bus Study being developed for MTC.
- **Environmental Issues**: For the purpose of the Regional Rail Plan, corridor options were screened to identify major environmental concerns. These include impacts to natural resources, section 4(f) impacts, environmental justice and right-of-way impacts either to existing or adjacent uses. Notable environmental concerns have been identified.
- Implementation Issues: Consideration was given to implementation risks including consistency with existing transportation plans, existing corridor ownership and usage (including freight traffic requirements), major environmental issues that may present implementation risk, and other factors.

Step Six: Regional Rail Alternatives Evaluation

The two systemwide alternatives – Alternative 1 Regional Rail with BART Systemwide Expansion and Alternative 2 Regional Rail with Railroad-Based Services Expansion – were evaluated on a corridor-by-corridor basis taking into account the evaluation criteria described above.

For each corridor, a recommended corridor treatment has been identified. The recommended alternative was developed based upon the evaluation factors for the services in the corridor with consideration for adjacent corridors and the overall regional rail network. In some cases, the recommended alternative consists of a blend of the two system alternatives or includes refinements suggested by the evaluation process.

BART System

BART options have been addressed within each of the individual corridors; this section provides a summary of all of the BART considerations.

Alternative 1 included all of the major BART system expansion options including the Transbay, I-80, I-680 and I-580 corridors in addition to Resolution 3434 projects (Warm Springs and Santa Clara BART, eBART and Oakland Airport Connector). By contrast, system expansion in Alternative 2 was limited to the Resolution 3434 projects with a one-station extension and connectivity enhancement in the I-580 corridor. Alternative 2 anticipates that BART would develop more like a "Metro" system to provide mass transit in the inner Bay Area. As such, Alternative 2 would include the potential for infill stations and other improvements in system capacity, coverage and operational reliability. The corridor-by-corridor analysis indicates that the BART system expansion options do not significantly add to the corridor ridership levels compared to the railroad-based options provided in Alternative 2.

One segment, which may require system expansion, is in the Oakland – San Francisco Transbay corridor where the highest ridership is present. In the near term, a construction of a fourth track through Oakland would improve line connectivity and capacity including providing for cross-platform transfers between all of the various lines. A new Bay Crossing and San Francisco subway would not only relieve the existing transbay tube and Market Street stations, but would provide an opportunity to improve coverage in San Francisco. The Regional Rail plan tested two alignments resulting in similar cost and ridership levels. Further study of alignments in San

Francisco would be appropriate at such time as a new tube were to be advanced for project development.

Plan Recommendation: Alternative 2 with further development of Metro operating plans and infrastructure; fourth track through Oakland; long-term new Bay Crossing and San Francisco subway line (alignment to be determined)

US 101 North Corridor

The US 101 North corridor has moderate ridership potential. Alternative 1 includes the SMART service between Larkspur and Cloverdale with capacity and operational improvements to address long-term growth in travel.

Alternative 2 includes a rail connection across the I-580 Bridge to connect the SMART line with the Capitol Corridor in Richmond. The cost of Alternative 2 would be nearly four times the capital cost of Alternative 1. However, the ridership in the US 101 corridor was found to be similar and the ridership on the East Bay connection was relatively low. As a result, Alternative 1 is recommended.

Plan Recommendation: Alternative 1

North Bay Corridor

The North Bay corridor between Marin and Solano Counties has low to moderate ridership potential. Only one rail service alternative was tested in the North Bay – an "X" service plan including an east-west line with a timed transfer to a north-south line at Napa Junction.

Plan Recommendation: Preserve corridor in near term and develop rail services in phased plan over the longer term

Interstate 80 Corridor

The I-80 corridor has high ridership potential, which is served by BART and Capitol Corridor along the Eastshore area with Capitol Corridor extending beyond to Sacramento. Alternative 1 would develop the Capitol Corridor line between Oakland and Sacramento with a range of capacity and operational improvements. Given the high existing level of freight traffic and the expectation that goods movement to and from the Port of Oakland will grow significantly, the line would need to be expanded to three or four main tracks where possible over the long term. The BNSF transcontinental freight line connects to the UPRR in Richmond: BNSF considers this line to be a vital freight connection to the Port of Oakland and does not to encumber the existing line with passenger traffic. (In fact, existing passenger trains entering the Bay Area from Stockton on the BNSF are shifted to the UPRR line east of Martinez near Port Chicago.) Passenger improvements would be focused on the UPRR line including a new high level passenger bridge at Benicia, and curve flattening between Pinole and Martinez.

Alternative 2 considered provision of separate passenger-only tracks within the UPRR right-of-way to support the operation of lightweight passenger equipment. This alternative also included a revised alignment north of Hercules to follow I-80 across a new Carquinez bridge at Vallejo and continuing on to reconnect with the UPRR corridor near Cordelia. Although Alternative 2 resulted in significant travel time savings and higher ridership compared to Alternative 1, the capital cost of Alternative 2 was about twice the cost of Alternative 1. In addition, implementation of separate passenger-only tracks for lightweight equipment is in conflict with UPRR policies as well as the long-range plan for the Capitol Corridor. Given that significant service improvements can be provided using standard equipment shared with freight, the evaluation indicates that Alternative 1 is the most appropriate solution for the corridor.

The BART extension to North Hercules would add \$1.5 to \$1.8 billion to the cost of the network making the total investment in the corridor similar between Alternative 1 and Alternative 2. However, with shared operation of the freight trackage and expansion to 4 tracks between Oakland and Richmond, there would be adequate track capacity to provide overlay services such as a "wBART" local train operating on conventional rail in lieu of extending the BART system. However, given the physical and operational constraints of the single-track BNSF line, the operation could likely be confined to the UPRR along San Pablo Bay.

Plan Recommendation: Alternative 1 with potential for local passenger services on expanded UPRR line

East Bay Corridor

The East Bay corridor between Oakland and San Jose has very high ridership potential and is served by BART and the Capitol Corridor. Alternative 1 would result in expansion of the Niles Subdivision to provide 3 main tracks for operation of passenger services shared with freight.

Alternative 2 considers construction of a new passenger line for lightweight equipment operating between Oakland and San Jose along the UPRR right-of-way north of Fremont and via I-880, Trimble Road and the Caltrain corridor south of Fremont. Provision of a new passenger-only line would require more than twice the investment required to upgrade the existing Capitol Corridor route and would not significantly reduce the travel time or ridership. In addition, Alternative 2 would require right-of-way to be obtained from UPRR and is not consistent with the Capitol Corridor long-range plan.

Plan Recommendation: Alternative 1

Transbay Corridor

The Transbay market between Oakland and San Francisco has the highest transit and rail ridership demand compared to any corridor or segment in the Regional Rail system – Under Year 2050 Baseline conditions without either Regional Rail Alternative, the Transbay corridor market potential is over 400,000 daily trips. Alternative 1 addresses this demand by providing a new BART Transbay Tube paired with a new San Francisco subway to provide station capacity to distribute patrons to stations and connect with regional and local services. Track connections could be made to the existing

Market Street line to improve system reliability by providing alternate means of routing trains between Oakland and San Francisco.

By contrast, Alternative 2 would make a track connection via a rail tunnel between trackage in the East Bay and Caltrain, thereby allowing movements such as interlining trains between the Capitol Corridor and Caltrain. However, with Capitol Corridor operating standard equipment and Caltrain tracks devoted to lightweight equipment, regulatory provisions – either a change in Federal Railroad Administration rules or rules waivers in conjunction with improved signaling to allow mixed flow would be required if trains were to interline between the East Bay and Peninsula.

Analysis of the Transbay peak period ridership indicates BART will be constrained Year 2030 and over-capacity by Year 2050. Therefore, a new Transbay Tube has been indicated in the long-range scenario. Given the significant environmental review process, regulatory approvals, and high cost of such an investment, it is recommended that, should a new Bay Crossing be provided, that a four track main tunnel would be developed to provide a conventional rail connection as well. This cost of this additional provision would be lower as a combined project than if separate BART and rail tunnels were to be built.

Plan Recommendation: Alternative 1 with Alternative 2 (both options in long term future)

Peninsula Corridor

The Peninsula corridor between San Francisco and San Jose has high ridership, which is served by Caltrain and, north of Millbrae, by BART. Both Alternatives 1 and 2 would include provision of electrification, additional trackage and grade separations included in the Caltrain long-range development plan to allow the service to operate with approximate 7.5 minute headways during peak periods. However, Alternative 2 includes a rail tunnel connection to the East Bay (cost included as part of "Transbay" corridor) and interlining of the Capitol Corridor trains through the Peninsula to San Jose. In the East Bay, the previously-mentioned Oakland – San Jose service on the new passenger alignment would provide service to the existing Capitol Corridor market. Alternative 2 would operate with lightweight equipment – electric multiple unit trains as indicated in the Caltrain Project 2025 plan. The primary factor resulting in higher cost in Alternative 2 is associated with providing a connection to the Transbay rail tunnel. In view the similar costs and ridership, Alternative 2 is recommended for consistency with the Caltrain desire to deploy lightweight equipment.

Plan Recommendation: Alternative 2

South Counties Corridor

The South Counties corridor extending south from San Jose to the Monterey Bay cities has moderate ridership potential. Both Alternative 1 and Alternative 2 would develop a network of standard rail services operating both along the UPRR Coast Subdivision as well as along a "wharf-to-wharf" line between Monterey and Santa Cruz with transfer points at Castroville

and Pajaro. Alternative 2 would develop a separate higherspeed passenger-only line south from San Jose to Gilroy with an extension to Hollister, which could be served by lightweight Caltrain equipment interlined to Peninsula destinations. The evaluation indicated that either alternative would have similar ridership potential. However, Alternative 2 would require nearly twice the capital investment to provide separate higher speed passenger tracks and would also require riders to transfer at Gilroy for Peninsula services. As a result of the evaluation. Alternative 1 is recommended. It should be noted that when Caltrain converts the Peninsula line between San Francisco and San Jose to operation of lightweight equipment, standard equipment trains operating in the South Counties and into the Bay Area might not be able to operate north of San Jose. Such trains could, however, proceed north along tracks shared with freight in the East Bay. Therefore, interlining South Counties services with East Bay services may be appropriate in the longer term.

Plan Recommendation: Alternative 1

Dumbarton Corridor

The Dumbarton corridor between Redwood City on the Peninsula and Union City via Fremont has low to moderate ridership potential. Alternative 1 includes the cost of restoring the bridge connection as a single-track bridge as well as additional improvements necessary to provide a connection to the Union City BART station along the Oakland Subdivision including provisions to separate passenger and freight traffic south of Industrial Boulevard in Hayward by routing freight traffic via the Niles Subdivision and passenger only traffic via the Oakland Subdivision.

Alternative 2 would include construction of a new 2-track, high-level bridge connection suitable for interlining lightweight equipment between Union City and points along the Peninsula. The evaluation indicated that ridership would be significantly higher if trains from Union City could operate on Peninsula trackage. However, providing a new bridge connection would nearly double the cost of the project. The recommended alternative, therefore, is provision of separate passenger tracks through Fremont over to Union City operating over a rehabilitated bridge as included in Alternative 1 – there would be adequate capacity for the purpose of the Dumbarton operating plan to utilize the existing single-track low-level bridge.

Plan Recommendation: Blend (Separate passenger tracks with rehabilitated low-level bridge)

Interstate 680 and Tri Valley Corridor

The Interstate 680/Tri Valley corridor has moderate ridership potential with an east-west market paralleling I-580 and a north-south market paralleling I-680. Alternative 1 includes a high capital cost BART line in the I-680 corridor as well as a longer extension in I-580 to Greenville Road. By contrast, Alternative 2 has a regional bus option in the I-680 corridor, a shorter BART extension to a new ACE intermodal at Isabel/Stanley, and a significant upgrade of the ACE service to Caltrain-like performance by providing separate passenger-only tracks with a new alignment over Altamont Pass and a tunnel under Niles Canyon. Alternative 2 resulted in significantly higher ridership due to the east-west improvements however the ridership gain was not high

enough to justify the expenditure of four times the capital cost of Alternative 1 for rail improvements.

Additionally, the freight rail line would need to remain in service to accommodate freight traffic between the Central Valley and East Bay / South Bay, and improvements could be made to the existing line and/or on the parallel abandoned Southern Pacific line to improve the reliability and frequency of ACE services shared with freight. A one-stop BART extension to meet ACE would improve connectivity and coverage with less cost than an extension in the median of I-580 all the way to Greenville Road.

Bus in the I-680 corridor would be more cost effective than a new BART line and would leverage several existing and planned express bus/BRT investments. Review of the station boardings indicated that most of the high ridership locations were concentrated in the San Ramon – Pleasanton reach which could be served by bus in the corridor connecting to existing BART lines.

Plan Recommendation: Blend (Alternative 1 for railroad-based services plus Alternative 2 for BART)

Central Valley Corridor

The Central Valley corridor has relatively low ridership potential compared to most of the other Regional Rail corridors. Alternative 1 would provide trackage improvements for shared operation of passenger services north-south along the corridor as well as connecting services through the Tri Valley area to the inner Bay Area. Alternative 2 would provide separate passenger-only trackage suitable for operation of lightweight trains provided such trains could operate into this territory from the inner Bay Area, which would require treatment similar to Alternative 2 to be provided through the Tri Valley. Regardless of the development of regional corridor trains serving the Central Valley, the Amtrak San Joaquins would continue to provide long-haul services on less frequent schedules. As shown in the evaluation, Alternative 2 would be about twice the cost of Alternative 1 but was not found to carry significantly more riders in the north-south direction (although significantly higher ridership to the East Bay would result as shown in the evaluation of the Tri Valley corridor.)

The overall level of corridor ridership between the Central Valley and the Bay Area was not deemed high enough to justify the very high cost of providing separate trackage for lightweight equipment in the Central Valley, even if it could operate though the Tri Valley area. Therefore Alternative 1 is recommended. However, UPRR has indicated that the north-south lines are approaching capacity and does not want to consider accommodating passenger traffic or selling right-of-way at this point in time. Accordingly, assembly of additional right-of-way paralleling the UPRR north-south alignment would be required to implement corridor passenger service along the UPRR alignment.

Plan Recommendation: Develop separate passenger right-of-way paralleling the UPRR right-of-way for operation of standard equipment

7.0 STUDY OUTCOMES

The Regional Rail study explores three study outcomes:

- 1. Regional Rail without High-Speed Rail
- 2. Regional Rail with High-Speed Rail entering from East (Altamont Pass)
- 3. Regional Rail with High-Speed Rail entering from South (Pacheco Pass)

7.1 Regional Rail Operating Plan Without High-Speed Rail

This section identifies the recommended services and improvements for the Bay Area Regional Rail Plan that emerged from the evaluation of Alternatives 1 and 2, assuming no high-speed rail. Absent high-speed rail, the recommended regional rail network would have the following key characteristics:

- **BART** Reinvest in existing system to improve reliability and make the following improvements:
 - Improve Core Capacity by making modifications to vehicles and stations as well as track and signals to accommodate passenger growth over the long term
 - Implement connectivity improvements to connect BART with standard railroad services and regional bus lines in various corridors including a one-station extension to an intermodal with ACE at Isabel/Stanley

- Construct 4th track through Oakland to facilitate throughput and improve transfer convenience between East Bay and Transbay lines
- Develop Infill stations at various locations keyed to local land use opportunities in accordance with BART station planning policies
- Further define "Metro" service plan to increase capacity, coverage and reliability to inner Bay Area including the Oakland - Transbay – San Francisco zone
- Pursue construction of a second Bay Crossing with new subway line to improve coverage to San Francisco in the long term (paired with rail tunnel)

The Transbay Tube under San Francisco Bay is the backbone of the system, with a throughput of 24-27 trains in each direction during the peak hour. Baseline improvements would improve service reliability and increase capacity of transbay car fleet with operation on 120-second headways. The Regional Rail Plan includes the provision of a second tube and San Francisco subway to relieve the existing tube.

Regionally, BART currently operates five lines as follows:

Pittsburg/Bay Point? Daly City: Service is provided on weekdays every 15 minutes early mornings, during peak periods, midday and evenings. Service is provided every 20 minutes late evenings and all day Saturdays and Sundays.

- Richmond? Daly City: Service is provided on weekdays every 15 minutes during peak periods and midday and on Saturdays every 20 minutes during peak periods and midday. No Sunday service.
- Dublin/Pleasanton? Millbrae: Service is provided on weekdays every 15 minutes early mornings, during peak periods, midday and evenings. Service is provided every 20 minutes late evenings and all day Saturdays and Sundays.
- Fremont? Daly City: Service is provided on weekdays every 15 minutes during peak periods and midday and on Saturdays every 20 minutes during peak periods and midday. No Sunday service.
- Fremont? Richmond: Service is provided on weekdays every 15 minutes early mornings, during peak periods, midday and evenings. Service is provided every 20 minutes late evenings and all day Saturdays and Sundays.

The Baseline anticipates reductions in headways to provide 12-minute service on all regional lines. In the longer term, in conjunction with the Regional Rail Plan, BART is considering development of a "Metro" service plan which would further reduce headways in the inner core to as low as 3-5 minutes depending upon the number of routes present.

• **US 101 North** – Implement SMART project; service plan in the early years will have trains operating on 30-minute headways during peak periods with an approximate 90-minute schedule between Larkspur and Cloverdale. Make

capacity and operational improvements over the long term to support 20-minute peak headways and higher ridership levels.

- North Bay Preserve corridor in near term and develop north-south and east-west services using standard equipment in the long term with service frequencies on each route of approximately 60 minutes throughout the day with timed transfers at key locations.
- **I-80 & East Bay** Expand the East Bay rail network from San Jose to Sacramento to 3 tracks with 4 track sections from Oakland to Richmond and in Solano County to support operation of standard higher speed railroad equipment compatible with freight traffic.

Current Capitol Corridor schedules provide approximate 60-minute headways during peak periods and shoulders of peak periods with approximately 190-minute running time in the Sacramento – Oakland segment and variable headways (14 trains daily) with approximate 70-minute running time Oakland to San Jose. Baseline improvements will reduce headways Sacramento – Oakland segment to approximately 40 minutes with 90-minute headways Oakland – San Jose. Regional rail plan improvements will further reduce aggregate headways Sacramento – Oakland to as low as 15 minutes and will reduce travel time between Sacramento and San Jose to 149 minutes. Some of the service in the inner East Bay may be provided by shorter distance trains operating between Union City and Hercules.

 Transbay – Provide near term investments in BART Core Capacity including provision of higher-capacity cars, track and signaling and operational improvements; provide new transbay tube and San Francisco BART line paired with rail tunnel in long-term future.

Currently, the maximum number of trains operating in the peak hour is 27 or 28. Baseline improvements will support reliable headways of 2 minutes in existing tube. The Regional Rail Plan includes a second tube and San Francisco line to distribute passengers and relieve overcrowding on the existing tube.

• **Peninsula** – Expand Caltrain to 3 or 4 tracks where feasible and operate with lightweight electric multiple-unit equipment to for rapid acceleration and frequent express and local service on the Peninsula.

Current service plan includes a mix of locals, limited stop trains and "Baby Bullet" express trains with aggregate headways of approximately 15 minutes during peak periods and 30 minutes off peak. Locals operate on approximate 95-minute schedules and express trains on approximate 60-minute schedule. Baseline improvements to the service plan will add trains to reduce aggregate headways to 10 minutes peak period and 20 minutes off peak. The Regional Rail plan anticipates the operation of additional trains to resulting in 7-1/2 minute headways during peak periods and 15 minutes off peak.

• **South Counties** – Caltrain currently operates 6 daily trains to Gilroy. Baseline improvements will enable an operating plan with 2-hour headways in the peak period, peak direction of travel. The Regional Rail Plan includes

extension of service to Salinas with further expansion of rail services in South Bay cities using standard equipment to provide rail connections to Monterey and Santa Cruz. Approximate hourly service would be provided on all lines with timed transfers at key locations.

- **Dumbarton** The Baseline service includes approximately two trains per hour operating between Union City and the Peninsula. The Regional Rail Plan includes provision of separate passenger-only trackage to Union City to support operation of lightweight compatible with Peninsula train operations allowing Dumbarton trains to interline with Peninsula services. Peak period trains would operate at 30-minute headways between Union City and the Peninsula with hourly service throughout the day.
- **Tri Valley / I-680** The existing ACE schedule includes 8 daily trains between Stockton and San Jose operating westbound in the am and eastbound in the pm. Trains operate on approximate 135 minute schedule. The Baseline improvements assumes the addition of trains resulting in 30 minute headways in peak travel direction only. Regional Rail plan would expand the Altamont and Tri Valley corridor lines to improve service reliability by adding trackage to the existing UPRR line and/or putting segments of the abandoned SPRR back in service to support expanded and improved passenger service along the ACE rail corridor and to accommodate regional freight trains; develop regional bus options in I-680 corridor. Hourly service would be provided in both directions with 30 minute service for peak period peak direction trains with an approximate 100-minute running time between Stockton and San Jose.

• Central Valley – Currently Caltrans Division of Rail operates 8 long haul trains daily between Oakland and Bakersfield with 4 long haul trains daily between Sacramento and Bakersfield. The Division of Rail is currently revising its long range plan. The Regional Rail plan includes expansion of regional service in the Central Valley to provide a regional corridor service between Sacramento and Merced over the long term, interlined with ACE services and complementing the San Joaquin long haul trains. Regional trains would operate on hourly schedules between Merced and Sacramento. Additional trains would operate from Modesto to Oakland or San Jose also on an hourly schedule resulting in 30-minute service over Altamont Pass between the San Joaquin Valley and the Bay Area.

Table 7.1-1: Alternatives Evaluation Summary Table -Regional Rail Without High-Speed Rail

	Capital Cost (S-million 2006)	Daily Travel Demand (Rail Trips 2050)	Operational Impacts	Coverage & Connectivity	Environmental Issues	Implementation Issues
BART	System *1					
Alt 1	BART \$21,700 – \$26,500 *2	845,000 - 1,030,000	Addresses transbay demand by providing new line to San Francisco New Transbay connection improves reliability	New SF subway line adds coverage to Alameda & NW San Francisco Capitol Corridor / BART at West Oakland (existing lines) & Jack London (new bay crossing) ACE / BART at Greenville/ I-580 in Livermore	New Bay Crossing Tunneling & subway construction impacts Impacts to freeway facilities Impacts to adjacent properties	Extensive planning process required to finalize extension alignments and stations Very large funding requirement Possible service disruption during construction
Alt 2	BART \$6,400 - \$7,900 *3	730,000 – 890,000	Addresses Transbay demand by increasing service in core and modifying car configuration	Capitol Corridor / BART at West Oakland ACE / BART at Isabel/ Stanley in Livermore Infill stations	Overall fewer impacts due to less system expansion	Refine policies to address infill stations

 $^{^*1}$ – Includes Warm Springs & Santa Clara Extensions and eBART (Resolution 3434) *2 – BART Cost Breakout: Includes 4^{th} Track through Oakland, new Transbay Tube and SF subway line, I-80 extension, I-580 extension to Greenville and new I-680 line

^{*3 –} BART Cost Breakout: Includes Infill Stations and I-580 extension to Isabel/Stanley

	Capital Cost (\$-million 2006)	Daily Travel Demand (Rail Trips 2050)	Operational Impacts	Coverage & Connectivity	Environmental Issues	Implementation Issues
US 101	North Corridor					
Alt 1	\$430 – \$530	Marin / Sonoma 9,000 – 11,000	Stand-alone service	Regional Bus and Ferry Connection to North Bay corridor at Ignacio	Nominal; mostly within rail right-of -way	
Alt 2	\$1,600 – \$1,950	Marin / Sonoma 12,000 – 15,000 Marin / Contra Costa 11,000 – 13,000	Service interlined with East Bay Services; more complex operating plan	Rail, Regional Bus and Ferry Connection to North Bay corridor at Ignacio Connection to Capitol Corridor at Richmond	New Bay Crossing	Schedule integration with East Bay services
North 1	Bay Corridor					
Alt 1	\$670 - \$810	Napa / Solano 3,000 – 4,000	North-south plus east-west corridor requires complex operating plan to serve all market patterns	Rail and Ferry Ties US 101 North rail corridor to I-80 rail corridor; only existing rail	Wetlands along east-west alignment	Schedule coordination of N/S with E/W service & E/W service with SMART, ferries and Capitol Corridor
Alt 2	9070 - 9010	Napa / Solano 3,000 – 4,000		connection		

	Capital Cost (\$-million 2006)	Daily Travel Demand (Rail Trips 2050)	Operational Impacts	Coverage & Connectivity	Environmental Issues	Implementation Issues
I-80 Co	orridor *4					
Alt 1	Rail & BART \$3,450 – \$4,180	Davis / Dixon 39,000 – 48,000 Contra Costa / Solano 43,000 – 53,000 Contra Costa / Alameda Rail & BART 84,000 – 103,000	Critical freight corridor most suitable for operation of standard passenger equipment Oakland – Sacramento travel time 92 mins	Bus, Amtrak & BART in East Bay; Bus, Amtrak & Sacramento Regional Transit LRT at Sacramento Maintains connectivity with San Joaquin long haul services at Martinez I-80 BART extension	Bay edge track improvements Pinole – Martinez, new bridge at Benicia, improvements through Suisun marsh and Yolo Causeway may result in impacts to SF Bay, US waters, wetlands and sensitive habitat Grade separation r/w and circulation impacts	Environmental clearance UPRR has accepted track improvements to provide passenger slots Grade separations and road closures developed incrementally in conjunction with four-track sections
Alt 2	Rail \$3,730 – \$4,560	Davis / Dixon 34,000 - 42,000 Contra Costa / Solano 56,000 - 68,000 Contra Costa / Alameda Rail & BART 133,000 - 163,000	Oakland – Sacramento travel time 63 mins	Bus, Amtrak & BART in East Bay, Bus, Amtrak & Sacramento Regional Transit LRT at Sacramento Provides direct rail service to Vallejo; does not serve Martinez Amtrak Connects with new Oakland – San Francisco rail tunnel	Slightly less overall impact compared to Alt 1 but new water crossing (Carquinez) and improvements at Yolo Causeway may result in impacts to SF Bay, US waters, wetlands and sensitive habitat Grade separation r/w and circulation impacts	Environmental clearance Higher speed passenger tracks and four-track sections will require grade separations and closure of minor roads Construction of high speed passenger tracks in rail r/w conflicts with UPRR

connection to Coast	Operational Impacts Coverage & Environmental Issues Implementation Issues	million (Rail Trips 2050)	
Connection to Coast Subdivision; used to return empty containers to Port of Oakland Alt 1 \$1,110 - \$1,350 Rail & BART 91,000 - 111,000 Subdivision; used to return empty containers to Port of Oakland Potential for short haul freight Potential for short haul freight Oakland - San Jose travel Connection to Coast Subdivision; used to return empty containers to Port of Oakland Airport BART I-680 line and 2- station extension in I-580 provides significant increase in coverage and		Corridor *5	East Bay Co
	connection to Coast Subdivision; used to return empty containers to Port of Oakland Potential for short haul freight Oakland – San Jose travel East Bay; Caltrain and Valley Transportation Authority LRT in San Jose; Oakland Airport Trestle along Bay edge Newark – Alviso Trestle along Bay edge Newark – Alviso Trestle along Bay edge Newark – Alviso	Alameda / Santa Clara Alameda / Santa Clara Connection to Coast Subdivision; used to re empty containers to Po Oakland Rail & BART 91,000 – 111,000 Potential for short hauf freight Oakland – San Jose tra	
existing lines with new passenger alignment Valley Transportation Alameda / Santa Clara existing lines with new passenger alignment Valley Transportation Authority LRT in San Jose; Construction Oakland - San Jose travel Oakland Airport & San Separation using aerial Construction Passenger Construction Oakland Airport & San Separation using aerial Construction Passenger Construction Passenger Construction Oakland Airport & San Separation using aerial Construction Passenger Construction Passenger Construction Passenger Construction Oakland Airport & San Separation using aerial Construction Passenger Construction Pa	existing lines with new passenger alignment Coakland – San Jose travel time 41 mins East Bay; Caltrain and Valley Transportation Authority LRT in San Jose; Oakland Airport & San Jose Airport Great America station not served; replaced with I-880 East Bay; Caltrain and Valley Transportation Authority LRT in San Jose; Cakland San Jose travel tracks requires full grade separation using aerial structure or modification of local roadways and circulation Corridor long range plan Construction of high speed passenger tracks in rail r/w conflicts with UPRR	Alameda / Santa Clara Alameda / Santa Clara Oakland – San Jose tra time 41 mins	

	Capital Cost (S-million 2006)	Daily Travel Demand (Rail Trips 2050)	Operational Impacts	Coverage & Connectivity	Environmental Issues	Implementation Issues				
Transb	Transbay Corridor									
Alt 1	BART *6 \$10,200 – \$12,500	Oakland / San Francisco BART 396,000 – 494,000 New SF Subway *7 BART 35,000 – 43,000	Addresses Transbay demand with BART Construction of new BART tube and SF subway line improves BART system reliability	Bus, Amtrak & BART in Oakland; Bus, BART, Caltrain & MUNI LRT in San Francisco Construction of new BART SF subway line improves coverage to San Francisco	New Bay Crossing (BART)	Approvals for new Bay Crossing				
Alt 2	Rail *8 \$1,910 – \$2,330	Oakland / San Francisco BART 370,000 - 450,000 Rail 63,000 - 79,000 Total 433,000 - 529,000	Provides option to route East Bay & I-80 Corridor trains to San Francisco	Improves connectivity of Peninsula and East Bay rail networks	New Bay Crossing (Rail Tunnel)	Approvals for new Bay Crossing East Bay equipment not compatible with Peninsula equipment over long term Trade-offs between sunken tube & bored tunnel				

^{*6} – BART cost includes new SF subway line; cost of transbay crossing and SF subway to Market Street is \$7,200 – \$8,800 *7 – Trips within San Francisco (over and above Transbay trips through new tube) *8 – Rail cost includes transbay rail tunnel only

	Capital Cost (\$-million 2006)	Daily Travel Demand (Rail Trips 2050)	Operational Impacts	Coverage & Connectivity	Environmental Issues	Implementation Issues			
Penin	Peninsula Corridor *9								
Alt 1	\$4,250 - \$4,950	San Mateo / Santa Clara 41,000 – 51,000	Maintains ability to operate passenger shared with freight San Jose – San Francisco travel time 57 mins	Bus, BART & MUNI LRT in San Francisco; Bus, BART, Amtrak, Santa Clara Valley Transit Authority LRT, ACE, Capitol Corridor in San Jose; SFO Airport & San Jose Airport	Mostly within rail right-of-way Grade separation r/w and circulation impacts	Use of standard equipment not consistent with Caltrain long range plan for corridor Narrow r/w sections require tunneling or aerial track segments for express track			
Alt 2	\$4,400 - \$5,100	San Mateo / Santa Clara 49,000 – 60,000	Freight accommodated at night (temporal separation) San Jose – San Francisco travel time 45 mins	Bus & MUNI LRT in San Francisco; Bus, BART, Amtrak, Santa Clara Valley Transit Authority LRT, ACE, Capitol Corridor in San Jose; SFO Airport & San Jose Airport Connects to rail tunnel to East Bay at San Francisco	Mostly within rail right-of-way Grade separation r/w and circulation impacts	Use of lightweight equipment consistent with Caltrain long range plan for corridor Narrow r/w sections require tunneling or aerial track segments for express track			

Regional Rail Plan Draft Report Summary

	Capital Cost (S-million 2006)	Daily Travel Demand (Rail Trips 2050)	Operational Impacts	Coverage & Connectivity	Environmental Issues	Implementation Issues			
South	South Counties Corridor								
Alt 1	\$1,440 - \$1,760	Santa Clara / San Benito 6,000 – 8,000	Standard equipment may not operate north of San Jose on Peninsula in the event Caltrain is converted to lightweight equipment	Bus, Amtrak, BART, ACE, Caltrain& Capitol Corridor at San Jose Monterey Bay cities at Pajaro & Castroville	Mostly within rail right-of-way	Use of standard equipment compatible with existing freight corridor UPRR has accepted track improvements to provide slots for passenger service (San Jose to Gilroy)			
Alt 2	\$2,280 - \$2,790	Santa Clara / San Benito 10,000 – 12,000	Lightweight equipment can interline on Peninsula Standard equipment could not operate on trackage with lightweight equipment; w ould remain on freight track(s)	Bus, Amtrak, BART, ACE, Caltrain& Capitol Corridor at San Jose Monterey Bay cities at Pajaro & Castroville Forced transfer at Gilroy to lightweight equipment for trips between Bay Area and South Counties	Mostly within rail right-of-way	Requires high cost re-build of Monterey Highway to fit separate passenger tracks in narrow right-of-way Construction of high speed passenger tracks in rail r/w conflicts with UPRR			

	Capital Cost (S-million 2006)	Daily Travel Demand (Rail Trips 2050)	Operational Impacts	Coverage & Connectivity	Environmental Issues	Implementation Issues			
Dumb	Dumbarton Corridor *10								
Alt 1	\$680 - \$830	Alameda / San Mateo 6,000 – 8,000	Use of standard equipment may require forced transfer at Redwood City due to capacity constraints on Caltrain and use of lightweight equipment on Peninsula	Alts 1 & 2 similar – BART, Capitol Corridor & ACE in East Bay and Caltrain on Peninsula	Repair, replace missing bridge sections and return to service with single track bridge resulting in possible impacts to SF Bay waters, wetlands, wildlife preserve, sensitive habitat				
Alt 2	\$1,130 - \$1,380	Alameda / San Mateo 19,000 – 23,000	Lightweight equipment can interline on Peninsula Standard equipment from East Bay could not operate on trackage with lightweight equipment		Replacement Bay Crossing with 2-track high level bridge resulting in possible impacts to SF Bay waters, wetlands, wildlife preserve, sensitive habitat Higher potential for disruption compared to Alt 1	Approvals for new Bay Crossing			
*10 – Re	solution 3434								

	Capital Cost (\$-million 2006)	Daily Travel Demand (Rail Trips 2050)	Operational Impacts	Coverage & Connectivity	Environmental Issues	Implementation Issues	
I-680 &	Tri Valley Corri	dor					
Alt 1	Rail \$820 – \$1,010 BART *11	Alameda / San Joaquin Rail 8,000 – 9,000 BART Boardings BART *11	Standard equipment compatible with Capitol Corridor and existing Coast Subdivision Newark – San Jose Maintains ability to operate freight trains between East Bay and Central Valley using shared track	Bus, BART & ACE at Greenville/ I-80 New BART line provides coverage to I-680 corridor and connects Martinez Amtrak, existing BART lines and Silicon Valley BART	Mostly within rail right-of-way	Rail options in Altamont corridor would include expansion of UPRR subdivision and/or returning sections of abandoned SPRR to service	
Alt 2	Rail \$3,510 – \$4,290 BART *11	Alameda / San Joaquin Rail 18,000 – 22,000 BART Boardings BART *11	Central Valley lines need to be fully separated from freight Freight track(s) would need to remain in service to provide connection between East Bay and Central Valley Potential to interline with Peninsula with Alt 2 network to west	Bus, BART & ACE at Isabel / Stanley I-680 Regional Bus line provides coverage to I-680 corridor and connects Fairfield/Suisun Amtrak; Martinez Amtrak; BART, ACE and Santa Clara Valley LRT	Constrained r/w Livermore – Pleasanton makes fitting trackage and grade separations difficult as existing freight track(s) would need to remain in service	Rail options in Altamont corridor include costly new rail tunnel under Niles Canyon and new alignment over Altamont Pass Bus alternative in I-680 corridor consistent with Contra Costa County long range plans	
*11 – BA	11 – BART cost and ridership under review						

	Capital Cost (\$-million 2006)	Daily Travel Demand (Rail Trips 2050)	Operational Impacts	Coverage & Connectivity	Environmental Issues	Implementation Issues				
Central	Central Valley Corridor									
Alt 1	\$3,320 - \$4,050	Elk Grove / Lodi 5,000 – 6,000 Manteca / Modesto 6,000 / 8,000 Turlock / Merced 3,000	UPRR line approaching capacity; would require significant expansion in track capacity to accommodate passenger services	eBART extension to Tracy; Tracy to Patterson service ACE expanded to Sacramento – Merced Bus, Amtrak, Capital Corridor, LRT at Sacramento; ACE/eBART at Tracy; Amtrak/ACE at Stockton	New structures at riparian crossings	UPRR wants to preserve existing corridor for freight only				
Alt 2	\$5,490 – \$6,710	Elk Grove / Lodi 11,000 – 14,000 Manteca / Modesto 10,000 / 12,000 Turlock / Merced 4,000	Would require development of lightweight line over Altamont and down to San Jose to support existing ACE Lightweight network allows interlining on all branches	eBART extension to Tracy; Tracy to Patterson service ACE expanded to Sacramento – Merced Bus, Amtrak, Capital Corridor, LRT at Sacramento; ACE/eBART at Tracy; Amtrak/ACE at Stockton	Grade separation r/w and circulation impacts New structures at riparian crossings	UPRR wants to preserve existing corridor for freight only				

7.2 Phased Implementation of Regional Rail Without High-Speed Rail

The Regional Rail Plan is financially unconstrained, and funding availability is an important consideration when determining phasing. For purposes of this plan, considerations for phasing include the size of the potential market for various services in each corridor, the development of the systemwide network over time, and the potential to defer high-cost options until later phases. The phasing plan included herein will help to inform the investment decisions to be made in both the financially constrained and vision elements of MTC's Regional Transportation Plan (RTP).

Resolution 3434 defines various improvements in the Regional Rail corridors, which are potentially fundable by Year 2030. The Regional Rail Plan includes provisions, which would result in greater investment in regional services over a timeframe extending to Year 2050. In addition, the Regional Rail Plan also identifies near term provisions, which would be desirable in conjunction with development of projects defined in Resolution 3434.

In general, services and improvements which are high priority and potentially fundable in the near term given existing Resolution 3434 commitments were indicated in the near term. Projects that are very high in cost and which could potentially be deferred or which appear to have promise but are not needed in the near or intermediate term were included in the ultimate plan under the Year 2030 – 2050 category.

A *possible* phasing plan including brief description of the corridor services is presented in Table 7.2-1. The phasing plan is for Regional Rail without High Speed Rail. This plan is provided to show how the system could be improved in phases; development of projects and services would be tied to future project development activities to confirm travel market demands, project descriptions and costs as well as project and service implementation priorities.

Table 7.2-1: Corridor Synopsis & Phasing Plan

Corridor	Synopsis	Present – Year 2015	Year 2015 – Year 2030	Year 2030 – Year 2050
BART System	 Core Capacity investments to accommodate passenger growth and system expansion Resolution 3434 projects: Warm Springs Extension Silicon Valley Extension eBART Oakland Airport Connector Infill stations Operating plan refinements potentially including skip-stop and turn-back service Livermore extension to connect with ACE Completion of Oakland 4th track New transbay tube and SF subway line 	Warm Springs extension Oakland airport connector eBART service between Pittsburg and Byron (vehicle technology to be determined)	 Silicon Valley extension including San Jose airport connector Peoplemover connection to new West Oakland Capitol Corridor station Fourth BART track and Oakland subway lower level platforms Mac Arthur – Oakland Wye Livermore BART extension and ACE intermodal Dublin/Pleasanton – Isabel/Stanley (actual phasing to be determined by more detailed ridership and engineering analysis) Infill Stations (developed in accordance with BART policies) 	New Transbay Tube and subway line Oakland – Alameda – San Francisco (specific alignment to be studied further)

Corridor	Synopsis	Present – Year 2015	Year 2015 – Year 2030	Year 2030 – Year 2050
US 101 North (Marin – Sonoma)	 Sonoma-Marin Rail Transit Project (SMART) is implemented (Resolution 3434) SMART service operates with compliant equipment allowing some freight traffic during off-peak periods 	Track, signal and station Improvements to support Larkspur – Cloverdale service (SMART startup)	Operational improvements to support expanded operations	 Operational improvements to support expanded operations Potential extension to San Quentin ferry terminal with I-580 bus link
North Bay (Marin – Solano)	 Napa-Solano rail services are developed connecting between SMART line and Capitol Corridor Service operates with compliant equipment compatible with connecting lines 	Corridor preservation plan	Track, signal and station improvements to support initiation of Vallejo – Napa service	 Track, signal and station improvements to extend north-south service to St. Helena Track, signal and station improvements to support initiation of east-west service between San Rafael and Fairfield/Vacaville with Napa Junction timed transfer

Corridor	Synopsis	Present – Year 2015	Year 2015 – Year 2030	Year 2030 – Year 2050
I-80 (Auburn – Oakland)	 Capitol Corridor regional services between Auburn and San Jose are extended to Colfax with long-haul service to Reno/Sparks; capacity and operational improvements as well as new stations and grade separations are developed to support improved operation of corridor shared with high levels of freight traffic (Resolution 3434) Investments are made in UPRR main line between Port of Oakland and Nevada to support activities of Port of Oakland, California trade, and to allow long-haul freight service to be concentrated on the "Central Corridor" to free up other lines for regional passenger and freight movements Peoplemover connection to new Capitol Corridor station at West Oakland Overlay services are provided operating on passenger tracks in the East Bay between Hercules and Oakland/Union City 	 Third main track Oakland – Richmond Operational improvements to support extension of service to Colfax Hercules station Fairfield/Vacaville station Colfax station Outer Harbor Intermodal Terminal and new freight leads (Port of Oakland) Donner Summit tunnel improvements to allow operation of double-stack freight movements 	 Fourth main track Oakland – Richmond Relocate BNSF / UPRR junction from Stege to North Richmond wBART type service on UPRR (actual phasing to be determined by more detailed ridership and engineering analysis) Third main track Benicia – Auburn Dixon station Swanston station Peoplemover connection to new Capitol Corridor station at West Oakland Bridge rehabilitation for Martinez and I Street bridges 	 Revise passenger alignment Richmond – Ozol to add third track and improve operating speeds Bridge replacements at Martinez and I Street bridges

Conidor	Synopsis	Present – Year 2015	Year 2015 – Year 2030	Year 2030 – Year 2050
East Bay (Oakland – San Jose)	 Capitol Corridor services are expanded and improved with capacity and operational improvements as well as new stations for services operating between Oakland and San Jose (Resolution 3434) Oakland Subdivision is purchased; passenger services are shifted to it south of Industrial Parkway in Hayward providing new intermodal with BART and Dumbarton at Union City Niles Subdivision is improved to handle all traffic between Oakland and South Hayward; the line becomes freight-only south of Industrial Parkway in Hayward Regional freight operates over existing UPRR lines between the Port of Oakland and Niles / Newark; in longer term, freight trains use Niles Subdivision south of Industrial Parkway in Hayward and former Southern Pacific through Niles Canyon 	 Purchase Oakland Subdivision Oakland – Niles Restore track connection along Oakland Subdivision between Melrose (High Street, Oakland) and East Oakland yard for short haul freight (interim operations) Union City station, Shinn and Industrial connections and second track on Oakland Subdivision for passenger-only operation Hayward – Niles Second main track on Coast Subdivision Alviso – Santa Clara Second main track on Coast Subdivision Alviso – Santa Clara Construct separate passenger tracks within Niles Subdivision between South Hayward and 5th Avenue, Oakland 	Track, signal and grade separation improvements on Oakland Subdivision for passenger-only operation Union City – South Hayward Route freight traffic over Niles Subdivision between Oakland and Niles Junction, then either to and from the south via Warm Springs Subdivision to Milpitas or to and from the east via the former SPRR line through Niles Canyon	Second main track on Coast Subdivision Newark – Alviso Extend third main track between Market Street and Jack London Square in Oakland; revise roadway configuration and waterfront access and circulation

Corridor	Synopsis	Present – Year 2015	Year 2015 – Year 2030	Year 2030 – Year 2050
Transbay (Oakland - San Francisco)	 BART Core Capacity improvements are accomplished to address Transbay demand in early years Additional BART "Metro" provisions are implemented to increase service in core areas In long term, new Transbay BART tube and San Francisco subway is developed to reduce demand on Market Street subway and to improve coverage in San Francisco A four-track central segment is constructed to provide a conventional rail connection between Oakland and San Francisco; ultimately Caltrain and Capitol Corridor services may interline with signal improvements and revised regulations 	BART Core Capacity improvements	BART Metro improvements (to be defined)	New BART Transbay crossing and San Francisco subway (alignment to be defined) New standard rail Transbay crossing (service plan to be defined)
Peninsula (San Francisco – San Jose)	 Caltrain develops over time into a three and four track, grade separated, railway to support operation of lightweight electrified multiple-unit consists between San Francisco and Tamien Station in San Jose (Resolution 3434) Service to Gilroy is handled with standard equipment shared with freight operating on Coast Subdivision 	Grade separations and third/fourth main track	 Grade separations and third/fourth main track Electrification and lightweight EMU consists San Francisco – Tamien Transbay transit center 	

Corridor	Synopsis	Present – Year 2015	Year 2015 – Year 2030	Year 2030 – Year 2050
South Counties (Santa Cruz, Monterey, San Benito)	 Service between San Jose and Gilroy is extended to Salinas and Monterey; in longer term, when Peninsula converts to lightweight electrified equipment, the South Counties may be served by Capitol Corridor trains using standard equipment shared with freight on Coast Subdivision "Wharf to Wharf" service between Santa Cruz and Monterey is implemented using standard equipment connecting to the Salinas trains with timed transfers at Pajaro and Castroville A shuttle connection is provided between Gilroy and Hollister to meet all corridor trains 	 Second main track San Jose Gilroy Track, signal and station improvements to support service extensions to Salinas 	 Modified service plan to serve San Jose – Salinas territory using standard equipment operating on the Colfax – San Jose line Line restoration, track and signal upgrades and stations to support Santa Cruz – Monterey service and Monterey corridor trains 	Track, signal and station improvements to support passenger shuttle to Hollister meeting all trains at Gilroy
Dumbarton (Redwood City – Union City)	Dumbarton Rail project is implemented (Resolution 3434) The service operates with standard equipment in the near term; separate passenger trackage is developed in the Centerville line over the longer term allowing operation of lightweight equipment between points along the Peninsula and the greater East Bay	Bridge, track and signal improvements are made to support initiation of service between Redwood City and Union City across the Dumbarton Bridge	Passenger only tracks constructed between Newark and Niles to allow operation of lightweight consists between Peninsula and East Bay	

Corridor	Synopsis	Present – Year 2015	Year 2015 – Year 2030	Year 2030 – Year 2050
I-680 & Tri Valley (Contra Costa & Southern Alameda)	 Near term investments are made to Oakland Subdivision to improve reliability of ACE services sharing with freights; in the longer term, sections of the former SPRR are put back into service west of Pleasanton allowing freights to be separated from passenger lines Regional bus services are developed in I- 680 corridor connecting with regional rail An intermodal connection is made by extending BART to meet ACE in Pleasanton Regional freight operates between the San Joaquin Valley and Bay Area over the Altamont lines 	Track and signal improvements to Oakland Subdivision Niles – Tracy Regional bus in I -680 corridor	Restore SPRR to service Niles – Hearst (Pleasanton); use to provide direct freight connection to Niles Subdivision Construct passenger-only tracks between Hearst (Pleasanton) – Vasco Road (Livermore) to improve reliability of operations Livermore BART extension and ACE intermodal Dublin/Pleasanton – Isabel/Stanley (actual phasing to be determined by more detailed ridership and engineering analysis) Extend eBART to Tracy with intermodal connection to ACE	 Construct second main track between Vasco Road (Livermore) and Lathrop to improve reliability of operations Track, signal and station Improvements to West Side Line to extend service from Tracy – Patterson

Corridor	Synopsis	Present – Year 2015	Year 2015 – Year 2030	Year 2030 – Year 2050
Central Valley (Sacramento – Merced)	ACE services are expanded in stages along a new passenger-only line constructed in phases along the UPRR Fresno Subdivision between Sacramento and Merced	R/W plan for Central Valley lines Construct passenger-only line along UPRR Fresno Subdivision Stockton – 65th Street, Sacramento Construct new passenger platforms for San Joaquin trains at Stockton diamond and provide rubber-tired shuttle to Channel Depot (Stockton)	Extend passenger-only line along UPRR Fresno Subdivision Lathrop – Modesto Develop rail/rail grade separation between north-south UPRR line and eastwest BNSF line in Stockton to improve capacity and operations; relocate Stockton passenger platforms for UPRR and BNSF trains to crossing to provide vertical transfer	Extend passenger-only line along UPRR Fresno Subdivision Modesto – Merced
Grade Crossings and Grade Separations (All Lines)	Staged, prioritized improvements are implemented in accordance with train and highway conflict levels to improve grade crossing safety and implement "Quiet Zones" in the near term and to provide grade separations where needed in the long term	 Grade separation studies to define improvements and required r/w (corridor specific) Construct high priority grade separations along principal lines Construct "Sealed Corridor" safety improvements and implement "Quiet Zones" along crossings which remain at grade 	Construct second priority grade separations along principal lines	Construct grade separations needed for high speed operation along principal lines

7.3 Regional Rail With High-Speed Rail

Planning Context

The Regional Rail Plan effort was tasked with conducting a regionally-focused analysis of potential high-speed rail routes between the Bay Area and Central Valley. The study recommendations on the most promising high-speed rail alignments for Pacheco and Altamont Passes are formulated independently of the California High-Speed Rail Authority (CHSRA). The intent of this plan is to provide input to the CHSRA as it prepares its final environmental document for the Bay Area to Central Valley High-Speed Train Program. The CHSRA will ultimately decide on the preferred route for high-speed rail between the Bay Area and Central Valley. CHSRA has published a draft program-level environmental document which provides detailed information on potential impacts associated with a wide range of options under consideration in the region. The purpose of this section is to evaluate the high-speed rail options in the context of the recommended regional rail network absent high-speed rail including the benefits to the regional system which could occur with the addition of high-speed rail funding and service implementation.

CHSRA has indicated a willingness to support operation of regional operations which serve regional destinations over lines provided such services are operated with compatible equipment and that additional investments (such as four-track sections to allow regional trains to accelerate to re-join the main line with minimal impact to statewide express services) are made.

The high-speed trains under consideration by CHSRA operate with lightweight electric equipment at speeds which are generally over 100 mph and with a top speed of 220 mph over lines which do not have any grade crossings. (Highest speeds would be attained in rural areas or other stretches of track which would be generally tangent and where operation at speeds up to 220 mph would not conflict with adjacent land uses.)

Such lines would be similar to the separate, passenger-only lines which were generally shown in Alternative 2. Whereas Alternative 1 was developed to operate up to 79 mph using standard equipment in which operations would be shared with freight traffic (include grade crossings), Alternative 2 provides separate passenger-only trackage generally capable of speeds ranging up to and exceeding 110 mph depending upon the track alignment and adjacent land uses, generally devoid of grade crossings. Therefore, high-speed trains entering or operating within the Regional Rail network could operate over line segments shown in Alternative 2. The portions of Alternative 2 which were recommended for inclusion in the preferred Regional Rail network without high-speed rail, include the Peninsula Corridor (San Francisco – San Jose) and the cross-bay connection via the Dumbarton Bridge to Union City.

In addition to stations served by some or all statewide highspeed rail trains, Alternative 2 includes a number of stops where only Regional Rail trains would stop. Additionally, whereas some statewide trains would stop at some of the Regional Rail stops, most regional trains would stop at all of these locations (with potentially some Regional Express services with limited stops.) For these reasons, the overall speed of regional trains moving through the network would be slower than desirable for longer distance statewide express trains. For these reasons, additional improvements, including the provision of four-track sections approaching and departing stations as well as additional and more complex train signaling allowing regional and statewide trains to operate would need to be provided on the regional network in the event "overlay" regional trains would mix with statewide high-speed rail express trains.

CHSRA has prepared an initial statement on potential system phasing. This report, which was presented to the High-Speed Rail Authority Board in May, 2007, identifies a Phase 1 project extending from Anaheim to Los Angeles to Merced and the San Francisco Bay Area. In this context, a Central Valley segment extending to Merced (where the central yards and shops for the statewide network may be located) would be included in any Phase 1 project, along with a connection to the Bay Area to be identified. The phasing policy further defines the Bay Area connection to include "San Francisco, Oakland, or San Jose or any combination of those cities including all three cities" with the understanding that the selected Phase I segment will be further defined at the conclusion of EIR/EIS and after a preferred route or routes has been selected.

At the same time, it is important to recognize that CHSRA is committed to developing an ultimate network which would link all of California's major metropolitan areas, including San Diego and Sacramento. From the perspective of the Northern California region, this means that a Sacramento connection via the Central Valley is included in the high-speed rail plan. As service to Sacramento is also a consideration for the Regional

Rail Plan, the opportunity to support regional overlay services therefore extends beyond the inner bay area cities of San Francisco, Oakland and San Jose and would include, for example the ability to operate a regional service between Sacramento and Merced.

Finally, the CHSRA staging policy statement notes that local decisions to invest in regional corridors where high-speed rail may also provide service would provide opportunities for the CHSRA to leverage statewide funds with local investments to develop corridors for mutual benefit. In this regard, the policy statement specifically points to the Peninsula alignment: "should the San Francisco to San Jose segment be identified and selected as part of the preferred alternative, including this segment in Phase I will enable the Authority to maximize the use of these resources and will help to reduce the need for state funds." This is the same segment where the recommended Regional Rail Plan without High-Speed Rail identifies improvements to support operation of higher speed electrified trackage suitable for operation of multiple unit lightweight electric equipment with operational similarities to the statewide high-speed rail.

In summary, the following points emerge:

- Improvements to provide separate passenger-only regional rail trackage suitable for operation of lightweight equipment are most compatible with the high-speed rail system
- Additional investments would need to be made to the lines to provide four track sections approaching and departing regional stops and where regional stops are themselves

closely spaced, this may require development of extensive stretches of four track line

- Even though the cost of supporting regional and statewide services on the same line would add to the development cost of either service separately, combined local and statewide funding would potentially be available – this additional level of funding would allow identified improvements to Bay Area segments to occur sooner with the addition of high-speed rail funding than might otherwise occur absent high-speed rail.
- The recommended Regional Rail network includes a "high-speed ready" line along the Peninsula from San Francisco to San Jose as well as consideration for upgrading the Dumbarton project to provide trackage for lightweight regional trains operating between Union City and Peninsula destinations.
- The recommended phasing for High-Speed Rail will provide an initial investment in a segment in the Los Angeles area, a potential Central Valley segment between Bakersfield and Merced which could be used to demonstrate the 220-mph high-speed rail technology in addition to early investment in a selected Bay Area corridor. With further development of connections between the Bay Area and Central Valley segments, along with extension of the Central Valley segment to Sacramento, there would be numerous opportunities to support regional overlay services between Merced, Sacramento and the Bay Area in addition to operation of regional services within the Central Valley.

Regional Rail with High-speed Rail Entering from East (Altamont)

Tracy, Altamont and Tri Valley Segments

The recommended Regional Rail Plan without high-speed rail would provide substantial upgrades to the Altamont Pass and Tri Valley corridors to support higher frequencies, improved running times and fewer delays to ACE trains operating between the San Joaquin Valley and the inner Bay Area. The recommended Regional Rail plan would also provide capacity improvements to the "Central Corridor" route north out of Oakland to Richmond and beyond such that transcontinental freight traffic could generally be shifted away from the Tri Valley and Altamont lines thereby reducing freight impacts to the ACE services and freeing up capacity to operate a short haul freight connection using shorter trains operated by a public entity.

CHSRA studied a number of sub-options extending from the Central Valley over Altamont Pass including four alternatives through Tracy and four through the Tri Valley area. For the purpose of the Regional Rail Plan, the key consideration in Tracy is providing an intermodal which allows a future opportunity for connections to an ultimate eBART extension as well as service to Patterson via the West Side line. Further to the west in the Tri Valley area, the Regional Rail Plan identifies a one-station extension of the BART Dublin/Pleasanton line to an intermodal at Isabel/Stanley as the lowest-cost solution to provide connectivity between BART and ACE. The Regional Rail Plan is not financiallyconstrained and accommodates this connection in the ultimate plan. In this context, the most consistent alignment through the Tri Valley area would enter via one of the Altamont alignments connecting with the UPRR corridor through

central Livermore to meet a future BART extension at the Isabel/Stanley location. This routing would avoid the need to modify I-580 to accommodate high-speed rail and would make a connection to BART by a more direct route between Altamont Pass and Pleasanton than options following I-580. CHSRA would need to obtain an agreement to use the UPRR right-of-way; however this corridor includes wide segments due to a prior consolidation of former Southern Pacific and Western Pacific rail lines in the Tri Valley. The CHSRA environmental document identifies the UPRR / downtown Tracy alignment as the "Base Case" for Altamont analysis.

As the Regional Rail Plan envisions creation of the Livermore intermodal along with improving ACE services though investment in capacity and operational improvements along the route between Niles and Tracy, development of the corridor for high-speed rail service would provide an opportunity to develop a higher-speed passenger service where the market presently served by ACE is addressed with a regional overlay train operating along the high-speed rail alignment. Combined funding from regional and high-speed rail sources could accelerate these improvements. Regardless of high-speed rail some freight service would remain as this link is a key segment for regional freight mobility even though not located along the principal transcontinental lines extending north and east from Oakland. The combined requirement to accommodate high-speed rail while maintaining a freight connection could result in additional grade separations which would benefit highway and rail uses along with reducing community noise impacts.

Bay Area Segments

From Niles, where the high-speed rail alignment would reach the inner Bay Area, there are a number of combinations of improvements to reach most of the Bay Area principal cities. Beginning with the simplest and continuing on to those which are more complex, they would include:

• Connection to East Bay alignment between San Jose and Oakland – This alignment would require branching at Fremont and would provide direct service to San Jose and Oakland. This option would support regional services between the Central Valley and either of these two cities as well as support operation of a regional express between Oakland and San Jose. Regional Rail System Alternative 2 identified a speed rail alignment which is similar to the option studied in the CHSRA environmental document with modification to serve regional stops at Santa Clara (SJC), North First / Trimble, I-880/Montague and Union City (BART). The capital cost of this line segment is estimated at approximately \$3.4-billion.

Considerations with this option include:

Duplicate Investment: Commitments have already been made to improve Capitol Corridor service and to extend BART to San Jose but these improvements could not support high-speed rail service, which is on a different alignment. When fully developed, BART and Capitol Corridor will provide complementary rail options with BART serving more local stops and Capitol Corridor primarily serving regional stops.

- Risk of UPRR Right-of-Way Agreement: Risk of reaching agreement from UPRR to obtain the right to construct high-speed rail along the Niles Subdivision where the high-speed alignment is proposed between Mission Boulevard and Oakland.
- Need for Caltrans Approvals: The East Bay alignment also would require fitting aerial high-speed rail along the I-880 freeway south of Mission Boulevard towards San Jose with the potential for a long approvals process with Caltrans.
- Different Regional Alignment Niles San Jose:
 The regional rail alternative deviates from the highspeed rail alignment by swinging west to provide a
 stop at North First Street/Trimble Road to provide an
 intermodal connection to the VTA light rail as well as
 a stop at Santa Clara to provide an intermodal
 connection to San Jose Airport. While these
 connections have strong local support, the resulting
 alignment is significantly slower from the perspective
 of statewide high-speed rail for providing a line direct
 to San Jose from Niles.
- Bay Crossing Required to Serve San Francisco: An East Bay only alignment would not provide direct service to San Francisco. As the Baseline travel analysis indicates BART will be overtaxed without substantial Core Area improvements and will be heavily loaded even with Core Area improvements, lack of direct service to San Francisco ending in Oakland would not be a viable solution. As a result, a phase one project using the East Bay alignment would need to include a new bay crossing from Oakland to

San Francisco. Regardless of the cost of such a connection, a long timeframe would be needed to deliver such a project considering the development of mitigation measures and approvals. There is a risk that this segment could not be available for service in conjunction with other first phase improvements.

The cost of providing this connection for high-speed rail is estimated at \$2.1-billion which includes one half the cost of a four track sunken tube connection (the other 50% of the cost would be assumed to be allocated to provide a new BART connection.) The cost estimate is based upon use of a sunken tube which is necessary to allow a shallow entry into San Francisco to meet the Caltrain alignment at the Transbay Transit Center. (A two-track deep bore tunnel would cost less than \$1.75-billion and would result in reduced impacts to San Francisco Bay compared to a sunken tube but a deep bore tunnel alignment would not match the proposed track profile at the Transbay Transit Center.)

• Connection to Peninsula alignment between San Jose and San Francisco via Dumbarton – This alignment would require branching at Redwood City and would provide direct service to San Jose and San Francisco. This option would support regional services between the Central Valley and the Peninsula as well as providing an opportunity to support additional enhancements to "Baby Bullet" service by with additional trains and improved speeds between San Francisco and San Jose. (The regional rail System Alternative 2 is identical to the alignment studied in the CHSRA draft program EIR/EIS; the cost

of improving the Peninsula between San Jose and San Francisco is estimated at approximately \$5.5-billion.)

Considerations with this option include:

- Compatibility with High-speed Rail: The recommended regional rail plan includes improvements to the Peninsula line with fully separate passenger only trackage and operation of lightweight electrified equipment compatible with high-speed rail equipment.
- Significantly Higher Investment: To support highspeed rail with existing and proposed services, the Peninsula corridor would need substantial additional investments including the provision of four tracks wherever possible, requiring extensive use of subway or aerial trackage.
- Opportunity for Cost Sharing: There would be an opportunity for CHSRA to partner with Caltrain to defray the cost of investments in the Peninsula line by leveraging local and statewide funding.
- Opportunity for Incremental Improvement: In anticipation of high-speed rail, four track sections and grade separations which are currently being developed could allow for the Peninsula to become "high-speed rail ready" from the present time forward.
- Dumbarton Crossing: Whereas the recommended Regional Rail plan would provide separate passengeronly trackage between Redwood City and Union City using upgrades to the existing bridge, a high-speed rail

- line would require a new two-track high level bridge or tunnel connection across the Bay. Although a new bridge was recently constructed at the Carquinez Strait and the San Mateo Bridge trestle approach was recently widened across the Bay, a significant environmental process would be required especially through the Don Edwards Wildlife Preserve. The cost of this crossing is estimated at about \$1.8-billion.
- Fremont Centerville Line Segment: Improvements would need to be made across Fremont between Niles and Newark. One or two standard rail tracks would need to remain in place to serve ACE, Capitol Corridor and freight service making it difficult to fit two high-speed rail tracks with four-track stations and approaches. A combination of right-of-way takes and grade separations would be required to fit all of the services into the corridor.
- Branch at Fremont to San Jose via East Bay and Peninsula via Dumbarton This option would branch at Fremont to provide direct service to San Francisco via the Dumbarton and Peninsula and to San Jose via the East Bay. This option would support regional trains operating between the Central Valley and San Jose (thereby effectively upgrading the ACE service though operation of a regional overlay) as well as support regional overlay services connecting the Central Valley with San Mateo County and San Francisco.

Considerations with this option include:

Regional Service Plans: This option would provide a direct connection between Fremont but the high-

speed alignment does not serve regional stops identified under the System Alternative 2 alignment for Regional Rail which would include an intermodal connection with VTA light rail at North First / Trimble nor with San Jose airport at Santa Clara. Additionally, this option would not support operation of a high-speed regional train between Oakland and San Jose and only includes the portion of the Caltrain alignment north of Redwood City.

- Risk and Project Delivery Factors: This option includes many of the risks associated with both the East Bay and the Peninsula options including: UPRR right-of-way through Centerville, Caltrans right-of-way along I-880, and the Dumbarton Bridge crossing.
- Reduced Opportunity for Cost Sharing: Because this option only shares with Regional Rail north of Redwood City on the Peninsula, there would be no opportunity to leverage local investment in the Caltrain line between Redwood City and San Jose.

Recommended Bay Area Segments with Altamont Entry

Between these three principal options, improving the Peninsula alignment to support high-speed rail end to end between San Francisco and San Jose would maximize the partnership opportunities with CHSRA, could be incrementally developed, provides consistency with existing plans and minimizes duplication with committed plans and investments.

This option would require significant investment and would require following a potentially long environmental clearance process to clear and construct a crossing at Dumbarton; further project development and environmental effort would be required to obtain required rights-of-way and approvals for the entire segment back to a connection with the Central Valley line north of Merced, including at various "hard spots" where the right-of-way is restricted or where there may be impacts to adjacent land uses.

This option would support regional services operating with higher speed equipment between San Jose and San Francisco on the Peninsula as well as allow service to be provided between the Central Valley and Peninsula cities including San Francisco and San Jose.

Furthermore, whereas the estimated capital cost of the Peninsula alignment upgrade between San Jose and San Francisco is about \$5.5-billion versus about \$3.4-billion for an East Bay alignment between San Jose and Oakland, extending the East Bay segment to San Francisco via a Transbay tube connection would add as much as \$4.2-billion (total cost of 4-track sunken tube connection to accommodate high-speed rail and new BART line.)

By contrast, development of an East Bay option with direct service to San Jose and Oakland would include significant right-of-way risk gaining an agreement from UPRR to provide access to Oakland and would also require construction of a Transbay rail tunnel in order to serve San Francisco in the initial phase.

A composite option with a Dumbarton and Peninsula connection to San Francisco and a direct line from Fremont to

San Jose in the East Bay would save 18 minutes in travel time to San Jose, as the alignment in the East Bay is not direct but follows I-880 and then swings west to reach Diridon Station in San Jose. At the same time, this option would incorporate many of the risk and project delivery issues associated with both the Peninsula as well as East Bay alignments and would also not provide a logical routing for either a San Francisco – San Jose express train.

The recommended alignment on the Peninsula would not serve Oakland directly in the first phase. However, if BART were to be extended to an intermodal with the high-speed rail line in Livermore at Isabel/Stanley, Oakland passengers could transfer to BART and reach downtown Oakland in about 45 minutes time or access regional trains operating on the high-speed line in Fremont.

In the long term, a connection to Oakland could be provided by construction of a rail tunnel between San Francisco and Oakland thereby providing direct service to Oakland after a San Francisco stop. While construction of a new Bay Crossing at this location would require a long time for processing of environmental approvals and permitting, these issues are not considered to be fatal flaws.

Construction of a rail tunnel was estimated to cost about \$2-billion for a deep bore or \$3-billion for a sunken tube (total cost of a 2-track tunnel). A sunken tube would have more environmental impacts than a bored tunnel and would cost less but would provide a more shallow profile capable of meeting the Transbay Transit Center directly. As the Regional Rail plan has identified the need for an additional BART crossing between Oakland and San Francisco in the long term, it would be logical to provide a four track segment where

BART and standard rail could be accommodated in a single structure (separate approaches for BART and standard rail would be required in San Francisco as well as the East Bay due to differing connectivity requirements. By combining high-speed rail and BART for part of the distance across the bay, a lower cost project would result compared to development of separate alignments.

Extending high-speed rail trains across the Bay from San Francisco to Oakland as through trains in the long term would provide additional operational benefits:

- Overnight storage, light maintenance and provisioning could be provided in Oakland. This would reduce required station dwell times in San Francisco thereby increasing the capacity of the station to accommodate higher levels of terminating Peninsula trains.
- A rail connection between San Francisco and Oakland could also be used to bring trains from the East Bay across to San Francisco. (In order to fully exploit this opportunity, additional consideration would need to be given to resolving the operational incompatibilities between standard Capitol Corridor type equipment versus the lightweight equipment associated with Caltrain and High-Speed Rail. Potential approaches to this issue would include obtaining waivers or ultimate rule revisions from the Federal Railroad Administration allowing for mixed flow of lightweight equipment along the East Bay passenger-only tracks operating with standard Capitol Corridor equipment.)

Regional Rail with High-Speed Rail Entering from South (Pacheco)

Central Valley Segments

The environmental document prepared by CHSRA addresses design options for entering the South Bay from a point on the high-speed initial segment in the vicinity of Merced however from a regional rail perspective any design option would enter the inner Bay Area following Monterey Highway and the existing UPRR Coast Subdivision north to Diridon Station in San Jose.

Bay Area Segments

Similar considerations to development of lines north of San Jose with respect to the Peninsula versus East Bay alignments would pertain to a high-speed service entering from the south via San Jose: The most promising option would be to continue north along the Peninsula to gain the full advantage of marrying the service plans and investments to support high-speed rail, regional express and local trains in a shared corridor using lightweight equipment compatible with high-speed rail equipment.

As with Altamont Pass options with a first phase terminus in San Francisco, the high-speed line could be extended across the Bay to terminate in Oakland. This could be developed as a joint project in conjunction with a new BART connection and four track central section of Transbay rail tunnel.

The alternative to providing a new Transbay connection would require branching the service in San Jose and developing a separate high-speed line the entire length of the East Bay. The high-speed rail operating plan would need to spit service between San Francisco and Oakland and stub-end terminals would be required at both locations, along with some provisions for overnight/midday storage. As was noted under the evaluation of Altamont Pass options, the cost of the East Bay alignment is estimated at about \$3.4-billion. Extending the Peninsula alignment to reach Oakland via Transbay tunnel would cost about \$4.2-billion. However, that cost corresponds to a four-track connection including two BART tracks which includes some economies of scale. Strictly from a cost perspective, a two-track high-speed tunnel connection would cost less than construction of the entire East Bay alignment. Whereas the tunnel would require appropriate cost contingencies and would require a complex approvals process to define and adopt appropriate mitigations, the East Bay alignment would also include significant project risk factors with respect to obtaining right-of-way from the UPRR as well as potentially require modifications to I-880 and a Caltrans approval process. Finally, development of a separate East Bay alignment would not facilitate resolving the long term BART Transbay capacity need and investment in a new rail line the entire length of the East Bay for a new mode is redundant given the outstanding commitments to further develop the Capitol Corridor and extend BART.

In the event high-speed rail enters the Bay Area via Pacheco Pass and San Jose, with an initial phase including service to both San Jose and San Francisco via the Peninsula, regional service could be provided along the Peninsula between San Jose and San Francisco as described above. Such service could extend further to Oakland with construction of an ultimate new Transbay crossing and possibly along passenger-only tracks to Richmond with waivers or rules changes by the Federal Railroad Administration. In addition, regional trains

could be operated between San Francisco and Sacramento via San Jose and Merced.

The travel times between San Francisco and San Jose and northern San Joaquin Valley points would be substantially longer with Pacheco compared to Altamont. (E.g., travel time between San Francisco and Sacramento would be about 107 minutes via Pacheco versus 66 minutes via Altamont.)

On the other hand, with a Pacheco alignment, travel times between San Jose and Southern California and the Central San Joaquin Valley would be nearly one-half hour less than the Altamont alignment (e.g., Los Angeles to San Jose travel times of 2:09 vs. 2:37) and all trains would operate on a single route with no branches in service resulting in the highest number of statewide trains stopping at all destinations in the Bay Area.

Altamont Alignment with Pacheco Alignment

A recommendation regarding selection of an Altamont alignment versus a Pacheco alignment is a policy issue for the responsible elected and appointed officials to consider. The Regional Rail analysis does provide information on the cost, ridership and other issues relative to either of the two alignments to inform that policy discussion.

However, an alternative to selecting one route over the other would be to develop both alignments with different design criteria:

 Pacheco Pass Alignment – Designed for highest possible speeds as two-track alignment utilized by trains operating to and from Southern California • Altamont Alignment – Designed for speeds approaching the Pacheco and Central Valley segments were feasible but with two tracks and regularly-spaced regional stops (e.g., Manteca, Tracy, Livermore and Fremont) utilized primarily by trains operating to and from Sacramento with some trains operating from Merced.

By reducing the requirement along the Altamont Pass route to two tracks, right-of-way requirements and impact as well as adjacency impacts could potentially reduced. This could be significant in urbanized areas through which the alignment would pass. Although the total cost of developing both options would be greater than either of the two alone, the resulting system would attain the regional service and improved Sacramento to Bay Area access benefits of Altamont Pass with reduced impact.

Potential Phasing and Summary Comparison of Alignment Options

Table 7.3-1 presents potential phasing plans for Bay Area high-speed rail segments using either Altamont Pass, Pacheco Pass or a combination of these two routes along with comparison of the key features of the alternatives. The following phasing is indicated.

Phase 1 – In accordance with both the phasing policy of CHSRA as well as the recommended Regional Rail options is improvement of the Peninsula corridor to make it "high-speed ready" for operation as a grade-separated, higher speed alignment suitable for use of electric multiple unit equipment. High-Speed rail limited stop trains could serve Peninsula

destinations as a regional overlay to the long distance trains along with continued operation of local services.

Altamont Phases

- **Phase 2A** As the Regional Rail plan recommends upgrade of the Dumbarton service to provide a separate track connection for lightweight equipment between Redwood City and Union City, with High-Speed Rail this connection would be further improved to provide a minimum two-track main line over a new high Dumbarton Bridge bay crossing. Trains could operate direct to San Jose and San Francisco via the Peninsula alignment and, with an extension of BART to connect in Livermore, East Bay locations would have a connection to the High-Speed network. A wide range of regional overlay services would be feasible through Altamont Pass resulting in a major rail upgrade in the ACE market area. These could operate in conjunction with a north-south Central Valley overlay service between Sacramento and Merced.
- Phase 3A The ultimate construction of a four-track combined High-Speed Rail and BART tunnel in the San Francisco Oakland Transbay corridor would improve operation of the San Francisco station by allowing it to operate as a through station, and would provide direct service to Oakland with an intermodal connection to BART at West Oakland. Midday storage tracks could potentially be provided in Oakland along the I-880 freeway.

Pacheco Passes

- Phase 2P Development of the Pacheco Pass connection between the Central Valley segment and Gilroy would allow operation of high-speed trains from Southern California with direct service to San Jose and San Francisco. Construction of four-track sections could allow extension of the Peninsula services to Gilroy as part of the regional overlay service.
- **Phase 3P** Similar to the Altamont phasing, construction of a tunnel connection to extend a Pacheco Pass alignment from San Francisco to Oakland would provide an East Bay destination and connection to BART at West Oakland. With a Pacheco option, all trains would operate on a single route with no branching of the service, resulting in the highest level of service to the three major population centers in the Bay Area.

Altamont with Pacheco

• **Phase 3AP** – With a higher investment in Bay Area segments, high-speed trackage could be developed in both the Altamont Pass and Pacheco Pass. Northern California regional services would be primarily routed over Altamont and statewide trains from the south would be routed over Pacheco. With this option, four track sections would not be required. This would result in reduced cost compared to development of both segments with four track sections and would substantially reduce the right-of-way requirements at tight spots as well as reduce some of the adjacency impacts where the alignment would run through developed areas (most notably through Tracy, Livermore, Pleasanton and Fremont along the Altamont alignment

and thorough Gilroy, Morgan Hill and San Jose along the Pacheco alignment.) Operating plans could be developed to include some "limited stop" service between Sacramento and Bay Area cities via Altamont in conjunction with regional trains making all stops. Although this solution would be the highest cost, it would combine the travel time advantages of both routes and would retain the high level of service to all three Bay Area population center for statewide trains operating from the south.

Comparison Table

Table 7.3-1 presents a comparison of key aspects of the various phases and alignment options. Along with route diagrams for each phase, the table includes:

- Regional Investment The estimated capital cost of high-speed segments located within the region, sized to support regional overlay services in addition to statewide high-speed trains. (Sources include CHSRA and Earth Tech with review of prior cost estimates for Transbay and water crossings.)
- Regional Overlay Examples of regional overlay services which could be operated with the indicated regional high-speed rail investments.
- **Regional Market Potential** Order-of-magnitude estimate of market potential for regional travel across key selected segments of regional system served by various route options. These figures are based upon modeling conducted as part of System Alternative 2; specific ridership estimates would be dependent upon

- development of detailed operating plans which were not included in the Regional Rail effort.
- Statewide Express to Major Cities and Ridership Provides travel times to/from Bay Area destinations served to/from Sacramento and Los Angeles, along with ridership as evaluated in the CHSRA draft program level EIR/EIS.
- **Principal Points of Connectivity** Considers connectivity points based upon recommended regional rail plan network.
- **Comments** Provides general commentary on key topics including markets served, implementation issues and risks, potential environmental issues, etc.

Comparison Points

- An initial phase of investment in the Peninsula line would help make Caltrain, with a Year 2050 market potential of more than 16-million trips "high speed rail ready"
- Both Altamont and Pacheco options have similar total cost (\$16- to \$19-billion) for the Northern California network and ridership – although the Year 2030 ridership is slightly higher for Pacheco, Altamont taps in to a regional market with a slightly higher Year 2050 potential.
- Altamont and Pacheco alternatives have similar total regional ridership levels of approximately 32-million to 36million Northern California trips in Year 2030 (including

- both intra-regional trips within Northern California as well as inter-regional trips to points south of Merced).
- Altamont options have a slightly higher Year 2050 market potential of about 28- to 30-million trips vs. 26- to 29million trips for Pacheco due to the fact that the Altamont corridor has a higher regional ridership potential compared to the Pacheco corridor
- Pacheco options have a slightly higher inter-regional ridership (travel to points south of Merced) of approximately 28- to 29-million Year 2030 trips vs. Altamont's 26- to 28-million tips due to the more southern connection to the Central Valley and more direct access to Southern California.
- A combination of a two-track Altamont to support regional travel and a two-track Pacheco to support express service from the Peninsula would result in highest Year 2030 ridership and would tap into a significantly expanded Regional market potential of nearly 35-million trips compared to regional market potentials of 26- to 30million trips for Altamont or Pacheco alone.

Table 7.3-1: High-Speed Rail Options

Description	Capital Cost*	Regional Overlay Annual Market Potential Year 2050 †
Phase 1 (Year 2015)	,	
Phase 1 - Peninsula SF OAK SAC FRE LIV GIL	 \$5.5B Peninsula Upgrade Regional Rail overlay service includes additional 4 track Stations along the entire corridor and a portion of the grade separations. 	San Jose – San Francisco San Jose, Santa Clara/SJC, Mountain View, Palo Alto, Redwood City, Hillsdale, Millbrae/SFO, 4 th /King, Transbay Market Potential: 16.5 m – Peninsula 16.5
Express Travel Times Annual Ridership Year 2030 ‡	Principal Points of Connectivity	Comments
 No statewide express this phase Starter segments in Los Angeles, Central Valley and Peninsula 	 Caltrain, Capitol Corridor, ACE, BART & VTA at San Jose Standard rail at San Jose (to Gilroy & South Counties) MUNI at 4th/Townsend AC Transit & BART at Transbay Transit Center SFO airport via BART SJC airport via peoplemover 	 High speed rail funding accelerates development of Caltrain to operate lightweight electrified multiple unit equipment Improvements on Peninsula corridor consistent with Caltrain long range plans; Peninsula investment avoids right-of-way risk and conflict with standard rail in East Bay; substantial investments in grade separation required to address narrow right-of-way at various locations Provides service to and adjacent to existing communities between San Jose and San Francisco

Description	Capital Cost*	Regional Overlay Annual Market Potential Year 2050 †
Altamont Options		
Phase 2 – Altamont SF OAK SAC SAC SJ GIL Express Travel Times	 \$16.8B Peninsula Upgrade Altamont Pass – Fremont with 4-track sections Dumbarton Bridge (High Bridge) Regional Rail overlay includes; additional four track Stations in the Central Valley the Tri-Valley and the Peninsula. Principal Points of Connectivity	 Merced – San Francisco Merced, Modesto, Tracy, Livermore, Fremont, Redwood City, Hillsdale, Millbrae/SFO, 4th/King, Transbay Merced – San Jose Merced, Modesto, Tracy, Livermore, Fremont, Redwood City, Palo Alto, Mountain View, Santa Clara/SJC, San Jose San Jose – San Francisco Same as Phase 1 (ACE market served by regional overlay on high speed network) Market Potential: 28.5 m 16.5 m – Peninsula 6.0 m – Altamont 6.0 m – N. SJ Valley Comments
Annual Ridership Year 2030 ‡	•	
 San Jose 1:03 / 2:37 hrs San Francisco 1:06 / 2:36 hrs Intra-Regional Ridership: 7.6 m Inter-Regional Ridership: 26.1 m Systemwide Ridership: 90.8 m 	 Phase 1 plus: Capitol Corridor, Amtrak & RT at Sacramento Amtrak at Stockton BART at Livermore Capitol Corridor at Fremont 	 Reaches inner Bay Area at Fremont; branches at Redwood City to San Jose or Oakland via San Francisco; branch reduces service to SF and SJ Some project delivery risk with new Bay Crossing at Dumbarton; however, high speed rail funding allows construction of improved crossing Peninsula alignment avoids most conflicts with standard rail in East Bay Provides service to and adjacent to existing communities between Tracy and Fremont Provides better connection between central Bay Area and Northern San Joaquin Valley; service to San Jose and South Counties from Southern California is indirect

Description	Capital Cost*	Regional Overlay Annual Market Potential Year 2050 †
Altamont Options (cont'd)		
Phase 3 – Altamont SF OAK SAC RWC SI GIL	 \$19.0B Peninsula Upgrade Altamont Pass – Fremont with 4-track sections Dumbarton Bridge (High Bridge) Transbay Crossing (Rail Tunnel) with a Station at West Oakland Regional Rail overlay includes; additional four track Stations in the Central Valley the Tri-Valley and the Peninsula 	Merced – San Francisco – Oakland Merced, Modesto, Tracy, Livermore, Fremont, Redwood City, Hillsdale, Millbrae/SFO, 4th/King, Transbay, West Oakland Sacramento – San Jose Sacramento, Lodi, Stockton, Tracy, Livermore, Fremont, Redwood City, Palo Alto, Mountain View, Santa Clara/SJC, San Jose San Jose – San Francisco – Oakland Same as Phase 1 with West Oakland (Caltrain limited stop trains with extension to Oakland and ACE upgraded to operate as regional overlay services) Market Potential: 29.8 m 16.5 m – Peninsula 6.0 m – Altamont 6.0 m – N. SJ Valley 1.3 m – Oakland
Express Travel Times Annual Ridership Year 2030 ‡	Principal Points of Connectivity	Comments
• San Jose 1:03 / 2:37 hrs	Phase 1 plus:	Reaches inner Bay Area at Fremont; branches at
 San Francisco 1:06 / 2:36 hrs Oakland 1:14 / 2:44 hrs 	 Capitol Corridor, Amtrak & RT at Sacramento Amtrak at Stockton 	Redwood City to San Jose or Oakland via San Francisco; branch reduces service to SF and SJ relative to Pacheco • Additional project delivery risk with second Bay Crossing at Transbay but this connection provides service to Oakland without conflict with standard rail in East Bay
Intra-Regional Ridership: 8.4 m	BART at Livermore	and is consistent with need for new Transbay BART tube
Inter-Regional Ridership: 28.2 m	Capitol Corridor at Fremont	Provides service to and adjacent to existing communities between Tracy and Fremont
Systemwide Ridership: 92.7 m	BART & Capitol Corridor at W est Oakland	Provides better connection between central Bay Area and Northern San Joaquin Valley; service to San Jose and South Counties from Southern California is indirect

Description	Capital Cost*	Regional Overlay Annual Market Potential Year 2050 †
Pacheco Options		
Phase 2 - Pacheco SF OAK SAC FRE UN RWCD GIL	 Peninsula Upgrade Regional Rail overlay includes; additional four track Stations in the Central Valley, the Peninsula and Gilroy to San Jose with a four track section for freight and standard regional passenger service 	 Merced – San Francisco Merced, Gilroy, San Jose, Santa Clara/SJC, Mountain View, Palo Alto, Redwood City, Hillsdale, Millbrae/SFO, 4th/King, Transbay (Caltrain limited stop trains operate as regional overlay on high speed network; Sacramento – San Francisco express operates through Pacheω) Market Potential: 25.8 m 16.5 m – Peninsula 3.3 m – Pacheco 6.0 m – N. SJ Valley
Express Travel Times Annual Ridership Year 2030 ‡	Principal Points of Connectivity	Comments
 San Jose 1:18 / 2:09 hrs San Francisco 1:47 / 2:38 hrs Intra-Regional Ridership: 5.0 m Inter-Regional Ridership: 27.6 m Systemwide Ridership: 93.9 m 	 Phase 1 plus: Capitol Corridor, Amtrak & RT at Sacramento Amtrak at Stockton 	 Reaches inner Bay Area at San Jose and extends to San Francisco; provides higher level of service to San Jose & San Francisco Provides service to and adjacent to communities between Gilroy and San Jose Provides better connection between Peninsula, South Counties and Central San Joaquin Valley; does not serve East Bay except though San Jose

Description	Capital Cost*	Regional Overlay Annual Market Potential Year 2050 †
Pacheco Options (Cont'd)		
Phase 3 – Pacheco SF OAK SAC FRE SJ MCD	 \$18.6B Peninsula Upgrade Regional Rail overlay includes; additional four track Stations in the Central Valley, the Peninsula and Gilroy to San Jose with a four track section for freight and standard regional passenger service Transbay Crossing (Rail Tunnel) with a Station at West Oakland 	Sacramento – San Francisco – Oakland Sacramento, Lodi, Stockton, Modesto, Merced, Gilroy, San Jose, Santa Clara/SJC, Mountain View, Palo Alto, Redwood City, Hillsdale, Millbrae/SFO, 4 th /King, Transbay, West Oakland (Caltrain express with extension to Oakland operates as regional overlay on high speed network; Sacramento – San Francisco operates through Pacheco) Market Potential: 28.8 m 16.5 m – Peninsula 3.3 m – Pacheco 6.0 m – N. SJ Valley 1.5 m – Oakland
Express Travel Times Annual Ridership Year 2030 ‡	Principal Points of Connectivity	Comments
 San Jose 1:18 / 2:09 hrs San Francisco 1:47 / 2:38 hrs Oakland 1:55 / 2:46 hrs Intra-Regional Ridership: 5.9 m Inter-Regional Ridership: 28.6 m Systemwide Ridership: 95.8 m 	 Phase 1 plus: Capitol Corridor, Amtrak & RT at Sacramento Amtrak at Stockton BART & Capitol Corridor at West Oakland 	 Reaches inner Bay Area at San Jose and extends to San Francisco; provides higher level of service to San Jose, San Francisco & Oakland Provides service to and adjacent to communities between Gilroy and San Jose Provides better connection between Peninsula, South Counties and Central San Joaquin Valley; does not serve East Bay except though Oakland or San Jose

Description	Capital Cost*	Regional Overlay Annual Market Potential Year 2050 †
Combined Option		
Phase 3 – Altamont & Pacheco	• Peninsula Upgrade	Merced – San Francisco – Oakland Merced, Modesto, Tracy, Livermore, Fremont, Redwood City, Hillsdale, Millbrae/SFO, 4 th /King, Transbay, West Oakland
FRE	Pacheco – San Jose (Express tracks) and with Gilroy to San Jose with an additional four track section for freight and standard regional passenger service	<u>Sacramento – San Jose</u> Sacramento, Lodi, Stockton, Tracy, Livermore, Fremont, Redwood City, Palo Alto, Mountain View, Santa Clara/SJC, San Jose
3AP SJ MCD	Regional Rail overlay includes; additional four track Stations in the Central Valley and the Peninsula	Sacramento – San Francisco Limited Limited stops Sacramento – West Oakland via San Francisco
	 Altamont – Fremont (Regional tracks) with additional Stations Dumbarton Bridge (High Bridge) 	• San Jose – San Francisco Same as Phase 1
	Transbay Crossing (Rail Tunnel) with a Station at West Oakland.	(Caltrain express with extension to Oakland and ACE upgraded to operate as regional overlay services) Market Potential: 34.8 m
Express Travel Times Annual Ridership Year 2030 ‡	Principal Points of Connectivity	Comments
San Jose 0.56 / 2:26 hrs	Phase 1 plus:	Southern California express trains reach inner Bay Area
• San Francisco 1:15 / 2:45 hrs	Capitol Corridor, Amtrak & RT at Sacramento	 at San Jose with extension to San Francisco & Oakland Sacramento – San Jose / San Francisco limited stop trains operate through Altamont
• Oakland 1:23 / 2:53 hrs	Amtrak at Stockton	Provides service to and adjacent to communities between
Intra-Regional Ridership: 10.0 m	BART at Livermore	 Gilroy and San Jose as well as between Tracy & Fremont Provides good connection between Peninsula, South Counties and Central San Joaquin Valley; also provides
Inter-Regional Ridership: 29.0 m	Capitol Corridor at Fremont	good connection btwn. central Bay Area and northern San Joaquin Valley
Systemwide Ridership: 99.0 m	BART & Capitol Corridor at West Oakland	Risk with new Bay Crossings at Dumbarton & Transbay; avoids most conflicts with standard rail in East Bay

Notes:

- * Capital Cost of line and stations shown in Regional Rail Plan for high speed rail segments with indicated overlay services. Sources: Earth Tech (regional overlay and bay crossing costs including reconciliation with prior studies); California High Speed Rail Authority (high speed rail line and stations costs).
- † Indicates overall rail market potential of primary travel sheds served based upon travel across selected screenlines. Source: MTC Regional Rail travel demand analysis.
- ‡ Express train travel times to indicated major destination from either (Sacramento / Los Angeles). Source California High Speed Rail Authority, Draft Bay Area to Central Valley HST Program EIR/EIS; some Oakland statistics estimated based upon combination of alternatives. "Inter-Regional Ridership" includes trips between Northern California and balance of state south of Merced; "Intra-Regional Ridership" includes trips within Northern California.

8.0 Support Strategies

8.1 Land Use Strategy

Opportunities to Link Land-Use and Rail Investments

Transportation and land-use function as one integrated system. Yet, too often, planning for the two are disconnected. Better planning will help to meet some of the region's most pressing needs to create walkable communities with homes for people of all incomes, reduce our greenhouse gas emissions, provide congestion relief, and reduce the need to develop on our remaining open spaces.

Well-planned neighborhoods around transit stations can create financial savings for individuals and the region. Taxpayers also save when transit agencies generate more money from the farebox and require lower subsidies. Cities benefit from increased sales tax revenue from the stores that are typically part of mixed-use developments.

Over the past six years, regional agencies have acknowledged the potential to refocus growth into existing areas, primarily around transit, and are developing policies and programs to help make that happen. This potential certainly exists. The Bay Area is fortunate to have a strong existing network of rail, ferries, and major bus corridors. There are at least 305 existing stations and more almost every year. Between 2000 and 2004, furthermore, Bay Area voters supported \$12 billion in new transit investments that are catalyzing the next generation of rail expansions.

There are, however, considerable barriers to transit-oriented development such as the complex financing and land assembly process, existing zoning that precludes the required mix of uses and density, and the challenge of interagency coordination often required. Additionally, planning staffs are often stretched thin, and may not have the expertise, political support, or financial resources to work with developers to plan, finance and build transit-oriented developments.

The half-mile around the transit station is often seen as the most critical. This is the area within which people can walk to the station or from the station to their destinations. MTC's analysis of its 2000 Bay Area Transportation Survey found that in the Bay Area people who live and work near transit use transit 10 times more for daily trips than people who neither work nor live near transit.

Existing Land-Use Policies

Bay Area agencies have developed several innovative policies and programs that offer a solid foundation for the Regional Rail Plan.

- MTC's Transit Oriented Development (TOD) Policy applies to transit extension projects funded by regional discretionary money. Each transit extension project funded in Resolution 3434 must plan for a minimum number of housing units around the station area and/or along the corridor.
- BART's System Expansion Policy relies on agreements between BART and local jurisdictions regarding the achievement of ridership thresholds.

- The California High-Speed Rail Authority has adopted land use principles that include high density, a mix of land uses, grid street pattern and pedestrian-oriented design, and parking limits. At this time, they are preparing more detailed station area development policies and plans.
- MTC has also pioneered a range of programs, including its award-winning Transportation for Livable Communities (TLC) Program, to assist with planning and implementation of transit-oriented development, many of which have been emulated around the country.
- Four regional agencies MTC, Association of Bay Area Governments (ABAG), the Bay Area Air Quality Management District (BAAQMD), and the Bay Conservation and Development Commission (BCDC) are working on the "Focusing our Vision," or FOCUS effort, in concert with county congestion management agencies, transit providers and local governments throughout the Bay Area, to continue implementation of the 2002 Regional Smart Growth Vision. FOCUS seeks to strengthen existing city centers, locate more housing near existing and future rail stations and quality bus lines, encourage more compact and walkable suburbs, and protect regional open space by providing incentives to implement Priority Development Area (PDAs) and Priority Conservation Areas (PCAs)

Regional Rail Plan Considerations

The Bay Area has been an innovator with land-use policies for transit investments. Still, there is a need to not only expand existing approaches, but encourage use of as many new strategies as possible to ensure that the region's economy, environment, and people all benefit from our land-use and transportation decisions.

While land-use authority remains the prerogative of local governments, agencies involved in the Regional Rail Plan should integrate land-use into decision-making regarding where, when, and how to expand and improve our rail system. The following are the key considerations to enhance existing programs:

1. Monitor, Update and Expand Rail Station TOD Policies

Ridership studies continue to validate the immense importance of the half-mile radius surrounding stations, both as origins for people who live nearby, and as destinations for jobs, education, recreation or services. To ensure a strong transportation and land-use link in these areas:

- Evaluate MTC's existing land-use policy using the latest information about land use determinants on ridership, and strengthen the policy where appropriate.
- Any new rail expansion projects considered in this plan using public funds should be subject to existing or updated MTC, BART and CHSRA policies.
- Encourage more local governments to designate FOCUS priority development areas (i.e., planning for more housing growth around current and planned station areas) so that they may leverage state/regional resources to maintain the necessary infrastructure and support transit use.

 Through FOCUS and other forums develop a collaborative approach between regional agencies, transit operators, and local governments to help identify the transit supportive land uses to be built within a half-mile of transit stations and foster changes to local zoning ordinances to implement these uses.

2. Adopt Ridership Development Plans for the Broader Commute Shed

Individual transit agencies should adopt the collaborative nature of BART's ridership development process, which looks beyond the half-mile radius to the larger "commute shed." There should be a special emphasis on ensuring transit supportive land uses on major corridors that are adjacent to or feed into the transit station. These plans should be funded as part of the projects.

3. Seek State Bond Monies for Infill and Transit-Oriented Development: Proposition 1C and Proposition 84 were approved by voters in November 2006. Included within these propositions are accounts that can be used to support infill and transit-oriented development that the region is seeking to support through FOCUS. Since there is no assurance on that our region will have a say in how these monies are allocated, legislative advocacy will be required to ensure that the Bay Area's interests are represented in trailer bills for both propositions.

4. Expand the Resources Available to Help Cities

While the Bay Area has been a leader through programs such as TLC, there are additional unmet needs. Additional funding to expand existing programs and to initiate new

ones should come from county, regional, and state sources. In this way, we can further support effective planning and implementation of transit-oriented development.

5. Create a One-Stop Shop for Technical Assistance

Given the complexity and cost of creating comprehensive land use plans, one outcome of FOCUS might be the development of a one-stop shop, hosted by one of the regional agencies, that provides technical assistance to help cities, transit agencies and other stakeholders prepare station area plans and implement transit-oriented development.

8.2 Governance Strategy

Overview

Governance refers to the entity(ies) who assumes responsibility for planning, design, funding, construction, and/or maintenance and operations of passenger rail. As new elements of the regional passenger rail system develop over the next few decades, there could be increasing conflicts between the needs of passenger rail and freight trains. Generally speaking, the freight railroads would want to divest themselves of all dispatching responsibilities where passenger trains exceed 79 miles per hour. As rail expansion opportunities are pursued, such entity(ies) could provide a venue for negotiations between public and private interests for operating and dispatching rights, acquisition of access, and/or outright purchase of rights-of-way or portions of right-of-way from private freight rail lines and other rights-of-way required from private entities for rail/highway grade separations.

At the present time, there are a multiple transit operators in the Bay Area and Northern California. Not only are there numerous local transit operators, some of which also provide light rail service within local jurisdictions, but there are also multiple providers of regional rail and rail transit services with overlapping geographies.

New services identified in MTC Resolution 3434 will result in development of additional rail corridors involving additional jurisdictions and added complexity due to additional geographic overlaps. For these reasons, and as required by the enabling legislation authorizing and funding conditions for this Regional Rail Plan, the governance strategy was

considered with respect to modifications which would support implementation of the Regional Rail Plan.

This analysis did not delve into the topic in great detail; neither did it include in-depth nor independent management or peer reviews of the issues. What was accomplished was a literature review of alternative governance models from a national perspective, resulting in the identification of some alternatives with potential applicability to delivery of regional rail services in Northern California. Two workshops with general managers and elected representatives from Bay Area rail providers were also held to consider the issues and models as well as potential risks and benefits.

Existing Bay Area Regional Rail Operators

The Bay Area has four providers of regional passenger rail services. Each are described briefly below:

Caltrain

Regional rail commuter service is provided between Gilroy and San Francisco by the Peninsula Corridor Joint Powers Board (JPB), with representation from three members: City and County of San Francisco, San Mateo Transit District, and Santa Clara Valley Transit Authority. There is a nine-member board with three appointed representatives from each of the members. Formed in 1987, the JPB took over the responsibility for the service from the State of California (Caltrans Division of Rail) in 1992. The JPB owns 46 miles of right of way from San Francisco to Tamien and has trackage rights south to Gilroy, and contracts with Amtrak for operating personnel. Day-to-day management and staff

support is provided by the San Mateo County Transit District (Samtrans).

BART

The San Francisco Bay Area Regional Transit District was created by the Legislature in 1957, when it was expected that five Bay Area counties would be joining the effort to build the first new regional rail system. Eventually, the counties of Marin and San Mateo opted out of the district, leaving San Francisco, Alameda, and Contra Costa Counties (service is currently operated in San Mateo County under a purchase of service agreement between BART and Samtrans.) The agency is guided by nine elected board members representing that same number of districts in the three-county service area.

Altamont Commuter Express (ACE)

This service was created in 1997 through a Joint Powers Agreement between the San Joaquin Regional Rail Commission (SJRRC), Alameda County Congestion Management Agency and the Santa Clara Valley Transit Authority. Policy and day-to-day management are provided by the SJRRC. The board has eight regular members and two additional special voting members from BART and Alameda County. There are also ex officio members representing Caltrans District 10, San Joaquin Regional Transit District, and San Joaquin Council of Governments.

Capitol Corridor

Originally managed by Caltrans and still considered part of California Amtrak, this 170 mile system provides rail service to eight northern California counties (Placer, Sacramento, Yolo, Solano, Contra Costa, Alameda, San Francisco, and Santa Clara). The governing structure is a joint powers agreement between six local transit agencies that serve the counties

above. There is a 16-member board, with two representatives from each of the 8 counties. BART provides the policy and day-to-day management. Board appointments are made through the member transit districts. The current governance structure was put into place in 2003.

Governance Models

A literature review was conducted to identify various governance structures and enabling and/or means used to form them from various large metropolitan areas around the United States with some consideration for European models. From this research, four distinctively different models were identified that would have potential applicability to Northern California (see Table 8.2-1):

- **Decentralized** Characterized by multiple service providers with separate governance structures, as represented by the status quo in Northern California
- **Regional Federation** A loose form of association under an umbrella organization responsible for implementation of joint initiatives. Services are delivered within the region of the federation by separate operating entities each having separate staffs and reporting to separate boards.

The Regional Transit Authority (RTA) in Chicago exemplifies a federation style governance model. RTA is responsible for planning and budgeting of regional services in the Chicago area. Beneath the RTA are three service providers each with separate boards responsible for construction, maintenance and operations: the Chicago Transit Authority (CTA) which provides bus and rail

services within the City of Chicago; Pace, which operates suburban all of the suburban bus services consolidated under one entity, and Metra, which is the regional rail provider.

Within California, The San Diego Association of Governments (SANDAG) provides a slightly different approach to the federation model with SANDAG serving as lead agency for funding, planning, design and construction with separate operating companies as subsidiaries to provide maintenance and operations. The SANDAG consolidation was enabled by passage of state law SB 1703 in 2003.

Regional Rail Authority – This model illustrates the functional consolidation of all regional passenger rail services. All passenger rail services are unified under a single governance structure responsible for all aspects of rail ranging from planning and design to maintenance and operations. Regional rail authorities may or may not have direct funding authority granted to them. A regional rail authority can either be formed as a new district or provided by association as a joint powers authority. One example of this is the Southern California Regional Rail Authority (SCRRA), which performs planning, design, construction, management and operations for the Metrolink system. For the purpose of this discussion, the term "Regional Rail Authority" is meant to pertain to a single operator for the regional passenger rail mode rather than a particular vehicle of formation. For example, the SCRRA JPA includes the counties of Los Angeles, Ventura, Orange, Riverside and San Bernardino.

 Consolidated Regional Rail – Fully consolidated operations are provided in a number of East Coast cities including Boston, New York, Philadelphia and Washington DC. Consolidated authorities may have broad power ranging from funding through maintenance and operations over multiple modes with large geographic areas.

For example, the New York Metropolitan Transit Authority is responsible for a comprehensive network of transit, commuter rail, and bridge and tunnel facilities in the greater metropolitan area. The MTA functions with a board of seventeen members nominated by the governor, with some recommended by the New York City mayor and county executives of suburban counties.

There are also six additional rotating non-voting members who represent organized labor and the citizens' advisory committee. All board members must be confirmed by the New York State Senate. The service area covers Manhattan, Long Island, southeastern New York State, and the state of Connecticut, with an estimated population of 14.5 million. Subsidiaries include:

- New York City Transit provides subway and bus service to Manhattan, Brooklyn, Queens, the Bronx and the Staten Island Railway
- Long Island Rail Road commuter rail service from three hubs in New York City to eastern Long Island
- Long Island Bus formed in 1973 through combination of ten private bus carriers and provides service to 96 communities, 47 LIRR stations, and five

- subway stations in Nassau, western Suffolk and eastern Queens counties
- Metro-North Railroad consolidation of several private commuter railroads with service out of Grand Central Terminal northward to suburban New York and Connecticut
- Bridges and Tunnels system of five bridges and two tunnels in New York City serving more than a million people daily; surplus toll revenues help subsidize mass transit

Table 8.2-1: Governance Models

	Decentralized	Regional Rail Federation	Regional Rail Authority	Consolidated Regional Rail
Summary Description	 Multiple providers with separate boards JPA's for inter-jurisdictional operations Some coordination of services and joint initiatives on ad hoc basis supported by MOU's 	 One regional authority for funding and planning Separate operating entities with own boards for design and construction as well as maintenan ce and operations 	 Single provider with one board for "mega-region" Responsible for planning, design, construction as well as maintenance and operations 	One "mega-regional" board of control with funding, planning, engineering and construction as well as maintenance and operations consolidated
Examples	Bay Area Status Quo	Chicago RTA SANDAG	SCRRA (Metrolink) Sound Transit (Seattle)	New York, Boston, Philadelphia, Washington DC
Pros	No changes to existing entities required	 Easier to establish than regional rail authority or full consolidation Could provide an incremental path for change 	Provides high level of benefit with minimal organizational coordination once established	Grants maximum control and power to effect across-the-board initiatives
Cons	Does not provide any provisions for attaining desired outcomes except through ad hoc actions	Significant internal dialogue required to effectuate major across-the-board efforts	Potential for friction between regional rail network and local modes	Perception that local interests may not be served

Benefits/Risks

The following potential benefits and risks were identified with respect to moving toward a more centralized form of regional rail governance:

Potential Benefits

- Schedule Coordination
- Centralized Operations
- Uniform Fare Structure and Collection
- Railroad Negotiations
- Procurement Economies of Scale
- Improved Customer Service
- Streamlined Administration

Potential Risks

- Reduced Local Accountability and/or Autonomy, perceived or real
- Potential for Higher Labor Costs
- Potential for Work Stoppages

Workshops

Two workshops were held with general managers and board members representing Bay Area providers of regional passenger rail. At the workshops, the various issues, models, risks and benefits were discussed, along with identification of potential venues which would result in more unified delivery of services.

In looking at the most important benefits and risks from the list above, participants placed highest weight on "Improved Customer Service" as the most important benefit, closely followed by "Schedule Coordination". Of the risks, the highest rated concern was "Potential for Higher Labor Costs." There was a consistent viewpoint that the customer is the most important element to consider when managing and delivering rail services regardless of the governance structure in place. However, it was noted that consolidation per se may not necessarily result in improved customer service – in other words, a poorly run but highly consolidated entity may not deliver as good performance to the customer on the street as a less consolidated network of well managed providers. Although the participants' concern was primarily with delivery of rail services (as opposed to tackling the issues of local bus transit consolidation) it was noted that regional services of any nature such as regional bus lines should be considered in the event a new regional entity were to be formed.

Next Steps

Consensus emerging out of the partner workshops is that:

- A single or consolidated authority carries higher degree potential risks
- Existing regional coordination efforts are consistent with the evolution of a federation model
- Additional steps toward a federation model include, but not necessarily limited to, strategies listed in Table 8.2-2

Table 8.2-2 identifies various initiatives including present coordinated efforts and potential nearer and longer-term joint governance initiatives that could be considered. These questions ultimately are policy issues for resolution by MTC and affected rail operators.

Table 8.2-2: Joint Governance Initiatives

Current Regional Efforts	Near Term Continuum Efforts	Longer Term Efforts
Universal ticketing (TransLink®)	Railroad ROW negotiations/procurement	Create regional authority for funding and planning
Consolidated traveler information (511.org)	Rolling stock/equipment procurement	Create operating authority for higher- speed trains
Integrated Fares (RM2 - funded study underway)	Implement integrated fare policies	
Integrated Wayfinding Signing (Transit Connectivity Plan)	Uniform station development guidelines	

8.3 Funding Strategy

The Regional Rail Plan is a blueprint for future rail expansion in the Bay Area. Its intentions are twofold:

- 1) to create a long-term Bay Area vision and advocacy document for a world-class regional rail system; and
- 2) to inform the next generation of rail improvements beyond current MTC policy and funding commitments.

All elements of the plan – from right-of-way preservation to core capacity enhancements to system expansion – are considered in a financially unconstrained environment in order to identify the most important near-, mid- and long-term regional rail improvements without being burdened by a financial straight-jacket.

Funding rail expansion projects is no small task – particularly since the price tag for rail projects tends to be in the multimillions to billions of dollars. The estimated total capital investment for this plan is about \$45 billion in 2006 dollars. Capital costs were determined for each corridor based on infrastructure, vehicle and right-of-way requirements, and order of magnitude operational costs are currently under development. Capital costs for Alternative 1, which emphasizes investment in a significantly expanded BART system as the regional provider, is estimated at \$45 billion. Alternative 2, which places the focus on the development on new electrified passenger lines regionally which are separated from freight, has a \$40 billion capital cost. Overall, finding public and private revenues to fund capital construction is a sizeable challenge, which the region has tackled successfully in the past. However, the much bigger challenge is securing

additional revenues to pay for operating costs. This is why a complementary land-use strategies are so important to maximize ridership and minimize needs for additional operating subsidies.

Forging regional consensus behind a program of projects for purposes of advocating for and pursuing federal, state and regional funding has proven to be a critical first step in delivering high-priority rail expansions. Adopted in 1988, MTC's Resolution 1876 was the first consensus agreement in the region to champion high-priority rail expansions, including the BART extension to the San Francisco International Airport, new BART service to Dublin and Bay Point in the East Bay, and the Tasman light-rail extension in Silicon Valley. Resolution 1876 leveraged almost \$2 billion in state, regional, and local funds to obtain commitments for \$930 million in fiercely competitive federal New Starts funds for the Bay Area.

As part of the 2001 Regional Transportation Plan (RTP), MTC developed and ultimately adopted the successor consensus agreement for regional transit expansion – Resolution 3434. Resolution 3434 is a roughly \$13.5 billion program of rail, regional express bus, and ferry enhancements and expansions. The financial plan for Resolution 3434 is comprised of an array of federal, state and local sources and matched funds to projects based on project competitiveness and eligibility. MTC is currently developing a Resolution 3434 Strategic Plan, scheduled for release in 2008, to provide a financial framework for successful program and project delivery.

Funding for Regional Rail Plan investments beyond current Resolution 3434 commitments will likely come from multiple sources, as follows:

- **Federal**: Federal transportation funds from various programs benefit rail service and station development. Recently completed and current projects in the Bay Area that have received substantial federal funding include San Francisco's 3rd Street Light-Rail Extension and Santa Clara County's BART Extension to San Jose. Federal funding categories include New Starts, Small Starts/Very Small Starts, and other Federal Transit Administration funding categories. Most of these funding sources are dependent on annual appropriations from the federal government, though some programs are multi-year.
- State: State bonds have been a key funding source for rail and transit projects. Past bonds include the 1990 Passenger Rail and Clean Air Bond Act (Proposition 108), which generated \$1 billion in funding, and the Clean Air and Transportation Improvement Act (Proposition 116), which provided close to \$2 billion in one-time source of funding for rail and transit projects. Funding from both bonds are largely spent or dedicated to specific projects.

More recently, in 2006, California voters passed Proposition 1B, which provided roughly \$20 billion for transportation purposes statewide; that amount includes \$2 billion for freight-related infrastructure improvements (including rail freight) and another \$1.3 billion for Bay Area transit improvements.

In 2008, California voters are slated to decide on a High-Speed Rail Bond that will provide a substantial down payment towards the implementation of state-of-the-art high-speed rail system connecting the Bay Area to southern California. Other matching state and federal funding sources, as well as the CHSRA's broad contracting powers to secure private sector funds, will be pursued to fully implement the envisioned high-speed rail system.

Regional: Regional funding has been an important contributor to the funding and delivery of numerous transportation projects in the Bay Area. In 1988, Bay Area voters approved Regional Measure 1 (RM1), which authorized a standard auto toll of \$1 for all seven stateowned Bay Area toll bridges. The additional revenues generated by the toll increase were identified for use for certain highway and bridge improvements, public transit rail extensions, and other projects that reduce congestion in the bridge corridors. In 2004, voters passed Regional Measure 2 (RM2), raising the bridge toll by \$1.00. This extra dollar is to fund various transportation projects within the region that have been determined to reduce congestion or to make improvements to travel in the toll bridge corridors, including rail improvements and expansions.

Regional Measures 1 and 2 toll bridge funds are fully committed to projects and programs identified in their respective expenditure plans. Any potential surplus of toll revenues generated would be directed toward the regional bridge seismic program. Per the Streets and Highways Section 3091(h), the MTC/Bay Area Toll Authority shall, by January 1, 2020, submit a 20-year toll bridge expenditure plan for RM2 to the Legislature for adoption. Further, this expenditure plan shall have, as its highest

priority, replacement of transit vehicles. When the expenditure plan is developed, there may be potential opportunities to advocate for toll bridge funding for rail expansion projects identified in this Regional Rail Plan.

- Local: Local transportation sales tax measures have been the bulwark of the Bay Area's transportation funding over the past two decades. To date, seven of the nine Bay Area counties have successfully enacted voter-approved transportation sales tax initiatives. Notably, Resolution 3434 identifies over \$5 billion in local sales tax funding for rail expansion and improvement projects. Current regional rail projects like the East Contra Costa and Alameda/Santa Clara counties BART extensions and the Caltrain Downtown Extension are being funded in part through local sales tax measures. Future local sales tax funds, developer fees and private capital may be available for rail projects.
- **Public/Private Partnerships**: Private investment, mainly from the rail freight operators (Union Pacific and Burlington Northern Sante Fe, will be an important funding source to implement the railroad-based improvements recommended in this plan. The rail freight operators own most of the rail rights-of-way in the region and allow rail passenger use for a fee. The private railroads have and will continue to be funding partners to improve freight and passenger rail service to implement improvements that are mutually beneficial to both. As an example, the \$2 billion in Proposition 1B funding for freight infrastructure improvements requires up to a 50 percent match; the private railroads have indicated their interest in participating financially with local entities to

secure some of this funding for local rail freight improvements.

Public Private Partnerships (P3) are another way to leverage public monies. A good example of a P3 is the Oakland Airport Connector project. Since public funding for this project was not sufficient to cover capital costs of constructing the project, BART, in an effort to move this project forward will be seeking private investors, using a design-build-operate, best value contract award approach.

Upon its adoption in September 2007, this Regional Rail Plan will be an important input into MTC's long-range regional transportation planning effort. Transportation 2035, which is currently under development and slated for adoption in early 2009, will represent the transportation policy and action statement of MTC for how to approach the region's transportation needs over the next 25 years. It will propose a set of transportation investments that can be implemented with available funding as part of the financially constrained element of the plan as well as identify programs/projects in the vision element if new funding becomes available. Transportation 2035 may afford opportunities for including other regional rail expansion projects in its longer-term vision element.

9.0 IMPLEMENTATION

Implementation of the Regional Rail Plan will require a comprehensive approach. Attached to this Executive Summary is a possible phasing for the plan. The following key considerations pertain to plan implementation:

- Phasing The Regional Rail Plan report identifies a possible phased implementation plan which addresses near term (Year 2015) medium term (Year 2015 – 2030) and long term (post Year 2030 to Year 2050 and beyond) timeframes
- **Funding** Assembly of nearly \$50-billion present-day dollars for development of the Northern California regional rail network, including Resolution 3434 commitments and BART reinvestment, will require significant new sources of funds; funding is a top priority concern
- Governance / Rights-of-Way Arrangements The Regional Rail planning process considered governance and right-of-way issues which need to be addressed to fund, obtain rights-of-way, build, maintain and operate the regional rail network. Opportunities for joint programs or for new initiatives, which could be undertaken in the near term under a federation of existing operators, were identified and may be pursued further as part of potential new legislation. In the longer term, a regional rail federation could provide an umbrella under which negotiations with freight rail operators

- for acquisition of rights-of-way and operating rights could proceed.
- Land Use Policies Existing policies developed separately by BART, MTC and other entities governing station area developments could be unified and broadened to pertain to the Northern California "mega-region" to assure that the highest densities are developed along rail corridors and around stations/major connectivity points, thereby establishing the ridership markets and providing convenient access to the regional rail network.
- Integration with Other Planning Efforts: This Regional Rail Plan only focused on a single transportation mode rail. Therefore, this plan will ultimately need to be integrated with other regional planning efforts such as the Regional High-Occupancy Toll (HOT) Network Study, regional express bus plans, Water Transit Authority's Ferry Operations & Implementation Plan, MTC's Freeway Performance Initiative, and other regional and local planning efforts. The synergy between this Regional Rail Plan and other regional and local plans would underscore the importance of looking at and planning regional transportation from a multi-model perspective.

10.0 NEXT STEPS

Projects advanced under the Regional Rail Plan would be implemented in accordance with existing project planning, funding and project development procedures.

The following specific follow-on efforts are recommended:

- Evaluation Measures MTC adopted rail system expansion and improvement criteria during the development of its Resolution 3434 transit expansion program, and is currently developing a Resolution 3434 Strategic Plan to provide a framework for successful program and project delivery. This Regional Rail Plan helps inform the next generation of rail expansion beyond Resolution 3434.
- Travel Market and Ridership Analysis Detailed ridership studies to evaluate corridor service options
- Land Use Analysis Sensitivity testing should be performed for Regional Rail projects to reflect on-going refinements to land use visioning, particularly more focused land use patterns
- **Service Model** Additional analysis and testing should be used to identify specific operating plans including routings and frequencies
- **Cost Analysis** Cost estimates prepared for the Regional Rail plan are planning-level, order-of-magnitude cost and

- will be refined to reflect the level of detail of the project description as projects are further developed
- Environmental Clearance & Community Impacts –
 As rail projects and services are developed, full
 environmental review and public involvement will be
 provided to refine project specifics and identify mitigation
 measures.
- **BART Operations** BART will be leading its own effort to address passenger needs including development of criteria for infill stations, how to best implement its 30-year capital plan and strategic vision, constructing higher frequency line segments, skip-stop services and other improvements considered in this plan
- **High-Speed Rail** The CHSRA has released a Draft Environmental Impact Report/Environment Impact Statement (EIR/EIS) for the Bay Area to Central Valley portion of a statewide high-speed rail system which provides information on high-speed rail options, costs, benefits and potential impacts. The CHSRA will be accepting comments through September 2007 on the draft environmental document to inform the decision making process regarding preferred high-speed rail alignments and station locations within the Bay Area to Central Valley study area. The Regional Rail process will provide input to the CHSRA as it prepares its final environmental document and decides on the preferred routing for high-speed rail between the Bay Area and Central Valley.